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A SURVEY OF SERIOUS AIRCRAFT ACCIDENTS INVOLVING FATIGUE FRACTURE

VOL. 1
FIXED-WING AIRCRAFT

by

Glen S. Campbell, R.T.C. Lahey

National Aeronautical Establishment

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A SURVEY OF SERIOUS AIRCRAFT ACCIDENTS INVOLVING FATIGUE FRACTURE

VOL. 1 — FIXED-WING AIRCRAFT

ÉTUDE SUR DES ACCIDENTS IMPORTANTS D'AVIONS DÛ AUX EFFETS DES FRACTURES DE FATIGUE

VOLUME 1 — EFFETS SUR DES AVIONS

by/par

Glen S. Campbell and R.T.C. Lahey

National Aeronautical Establishment

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AERONAUTICAL NOTE
NAE-AN-7
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SUMMARY

A world-wide survey was done of serious aircraft accidents involving fatigue fracture. Volume 1 of the report deals with fixed-wing aircraft, while Volume 2 addresses rotary-wing aircraft. A total of 1466 fixed-wing accidents since 1927 were identified as having fatigue fracture as a related cause, and these accidents resulted in 1861 fatalities. The accidents cover civil and, to a limited extent, military aircraft. Accidents are listed by failure type, as well as by aircraft type. Engine/transmission failure and landing-gear failure were the most common cause of recent fixed-wing accidents, and currently there is an average of about 69 fixed-wing fatigue accidents per year.

RÉSUMÉ

Une étude mondiale a été faite sur des accidents importants d'avions dû aux effets des fractures de fatigue. Le volume 1 traite de ces effets sur des avions, tandis que le volume 2 s'adresse aux hélicoptères. Depuis 1927, 1466 accidents d'avions survenus ont été la cause de fractures de fatigue. De tous ces accidents, 1861 personnes sont décédées. Ces accidents touchent pour la plupart les avions civils tandis qu'un nombre limité touche les avions militaires. Ces accidents sont divisés en deux listes différentes, soit une liste sur les types de fractures et l'autre sur les types d'avions. Les deux types de fractures les plus souvent rencontrés sont les fractures du bloc moteur/transmission et celles touchant le train d'atterrissage. Actuellement, il y a environ 69 accidents dû aux effets de fatigue qui surviennent chaque année.

INDEX

Page
1.0 INTRODUCTION...1

2.0 DEFINITIONS AND ABBREVIATIONS......................................3

3.0 SOURCES OF INFORMATION...5

4.0 RESULTS..6
    4.1 Listing of Accidents...7
        4.1.1 Listing of Accidents by Failure Type.....................7
        4.1.2 Listing of Accidents by Aircraft Type....................8
    4.2 List of Repeated Failures......................................8
    4.3 Breakdown of Accidents by Year.................................9
    4.4 Initiation Sites...10
    4.5 Listing of Accidents by Country................................11

5.0 CONCLUSIONS..11

6.0 REFERENCES...12

7.0 ACKNOWLEDGEMENTS...13

TABLES

TABLE 1 - Summary of Accidents - Fixed-Wing............................17
TABLE 2 - List of Repeated Fatigue Failures - Fixed-Wing................18
TABLE 3 - Breakdown of Accident Types by Year of Accident - Fixed-Wing...24
TABLE 4 - Initiation Sites - Fixed-Wing.................................25
TABLE 5 - List of Accidents by Country - Fixed-Wing.....................27

FIGURES

FIG. 1 Number of Serious Fatigue Accidents - Fixed-Wing & Rotary-Wing....31
FIG. 2 Number of Serious Aircraft Accidents - Fixed-Wing.................32
FIG. 3 Number of Serious Aircraft Accidents - Rotary-Wing................32
FIG. 4 Causes of Fatigue Failures - Fixed-Wing Aircraft..................33

APPENDICES

PART I - LISTING BY FAILURE TYPE

A FIXED-WING AIRCRAFT - WING..A-1
B FIXED-WING AIRCRAFT - TAIL..B-1
C FIXED-WING AIRCRAFT - FUSELAGE..C-1
D FIXED-WING AIRCRAFT - FLIGHT CONTROLS.................................D-1
E FIXED-WING AIRCRAFT - ENGINE OR TRANSMISSION..........................E-1
F FIXED-WING AIRCRAFT - PROPELLER.......................................F-1
G FIXED-WING AIRCRAFT - LANDING GEAR....................................G-1
H FIXED-WING AIRCRAFT - MISCELLANEOUS...................................H-1

PART II - LISTING BY AIRCRAFT TYPE

I LIST OF FIXED-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE

Aero Commander A-9 Ag Commander (See Callar A-9)................I-23
Aero Commander 100 Darter Commander...............................I-1
Aero Commander 112..I-1
Aero Commander 200 (Meyers 200)...................................I-1
Aero Commander 500/520/560/680/681/685/690........................I-2

INDEX (Cont'd)

Page
Aero Commander S-2 Snow Commander (See Snow S-2)................I-97
Aero Commander 600 S-2R Thrush Commander........................I-3
Aeronca 7AC Champion..I-4
Aeronca 7GCBC Citabria (See Champion Citabria)..................I-47
Aeronca Super Chief...I-4
Aerospatiale Caravelle..I-4
AESL Airtourer..I-5
Airbus Industrie A300...I-5
Airspeed Ambassador...I-5
Airtourer (See AESL Airtourer)..................................I-5
American AA-1 Yankee (Trainer, T-Cat, Lynx).....................I-5
American AA-5...I-5
Armstrong Whitworth Argosy......................................I-6
Auster J1B..I-6
Auster 3F...I-6
Auster 5D...I-6
Auster 5J1..I-6
Avro CF-100 Canuck..I-6
....I-6

Barrett Cassut..
Bayles..I-7
Beech 18/C-45...I-7
Beech Baron (Travel Air, Cochise)...............................I-7
Beech Bonanza...I-9
Beech Twin Bonanza..I-10
Beech 60 Duke...I-13
Beech 90 King Air...I-13
Beech Musketeer (Sierra, Sundowner, Sport)......................I-13
Beech Queen Air...I-13
Beech 99 Airliner...I-14
Beech 200 Super King Air..I-15
Bellanca 7ECA/7GCBC Citabria (See Champion Citabria)............I-15
Bellanca 8GCBC Scout..I-47
Bellanca 14-13 Cruisair...I-15
Bellanca 14-19 Cruisemaster.....................................I-15
Bellanca 17-30..I-15
Boeing/Stearman Kaydet (PT-13, PT-17)...........................I-16
Boeing B-17...I-16
Boeing B-47 Stratojet...I-17
Boeing B-52 Stratofortress......................................I-17
Boeing 377 Stratocruiser..I-18
Boeing 707/720..I-18
Boeing 727..I-18
Boeing 737..I-20
Boeing 747..I-21
Bolkow 208..I-21
Bowers Fly Baby...I-21
Bristol Britannia..I-21
Bristol 170 Wayfarer/Freighter..................................I-21
British Aerospace Buccaneer.....................................I-22
Britten-Norman Islander...I-22
Britten-Norman Trislander....................................... I-22
Bucker Jung BU-131..I-22
Bushby/Long Midget Mustang......................................I-22
....I-23

INDEX (Cont'd)

Page

C.A.C. CA-28 Ceres (See Commonwealth CA-28 Ceres).........I-48
Callair A-5.........I-23
Callair A-9.........I-23
Canadair CL-41 Tutor.........I-23
Canadair CL-44.........I-23
Canadair CL-84.........I-24
Centre Est (See Robin).........I-94
Cessna T-50 Crane.........I-24
Cessna 120.........I-24
Cessna 140.........I-24
Cessna 150.........I-25
Cessna 170 (L-19).........I-28
Cessna 172 Skyhawk.........I-28
Cessna 175 Skylark.........I-31
Cessna 177 Cardinal.........I-31
Cessna 180 (Skywagon).........I-31
Cessna 182.........I-34
Cessna 185.........I-37
Cessna 188 AgWagon/AgPickup/AgTruck/AgHusky.........I-38
Cessna 190.........I-40
Cessna 195.........I-40
Cessna 206 Skywagon.........I-40
Cessna 207 Skywagon.........I-42
Cessna 210 Centurion.........I-42
Cessna 305 Bird Dog.........I-44
Cessna 310.........I-44
Cessna 320 Skynight.........I-45
Cessna 336 Skymaster.........I-46
Cessna 337.........I-46
Cessna 402.........I-46
Cessna 411.........I-47
Cessna 421 Golden Eagle.........I-47
Champion Citabria.........I-47
Champion Tri-Traveler.........I-48
Commonwealth CA-28 Ceres.........I-48
Commonwealth 185.........I-48
Consolidated PBY Catalina.........I-49
Convair B-36.........I-49
Convair 240/340/440/580/600.........I-49
Convair 990.........I-50
Cooney R-1 Tomcat.........I-50
Cropmaster YA1-25.........I-50
Culver V.........I-50
Curtiss AT-32 Condor II.........I-50
Curtiss C-46 Commando.........I-50
Curtiss SB2C Helldiver.........I-51

Dassault Mirage III.........I-51
de Havilland D.H. 82 Tiger Moth/Queen Bee.........I-52
de Havilland D.H. 104 Dove.........I-52
de Havilland D.H. 114 Heron.........I-52
de Havilland Comet 1.........I-52
de Havilland Comet 4.........I-52
de Havilland DHC-1 Chipmunk.........I-53

INDEX (Cont'd)

Page

de Havilland DHC-2 Beaver..I-53
de Havilland DHC-3 Otter..I-54
de Havilland DHC-6 Twin Otter..I-54
Dornier Merkur..I-54
Dornier 27..I-54
Douglas A-26/B-26 Invader..I-54
Douglas DC-3/C-47/Dakota..I-55
Douglas DC-4..I-56
Douglas DC-6..I-57
Douglas DC-7..I-58
Douglas DC-8 (See McDonnell Douglas DC-8)..I-73
Douglas DC-9 (See McDonnell Douglas DC-9)..I-73
Dutton SPL J-4..I-58
Dyke Delta..I-58

Erco Ercoupe 415-C..I-58

Fairchild C-119 Packet..I-59
Fairchild F-27 (See Fokker F-27)..I-60
Fairchild Swearingen (see Swearingen)..I-100
Fairy Gannet..I-59
FFA Diamant (Sailplane)..I-59
Fleet Model 1..I-59
Fleet Model 80 Canuck..I-59
Fletcher FU-24..I-59
Fokker DR-1..I-60
Fokker F-27 Friendship..I-60
Folland Gnat..I-60
Fuji FA 200 Aero Subaru..I-60
Funk F-23..I-60

General Aircraft Cygnet II..I-61
General Dynamics F-16..I-61
General Dynamics F-111..I-61
Glasfluegel Standard Libelle (Sailplane)..I-61
Glendening Stits (See Stits)..I-100
Globe GC-1B..I-61
Great Lakes Sport Trainer..I-62
Grumman AA-5 (See American AA-5)..I-5
Grumman AgCat..I-62
Grumman Avenger..I-63
Grumman Goose..I-63
Grumman Mallard..I-64
Grumman OV-1 Mohawk..I-64
Grumman Tracker..I-64
Grumman Widgeon..I-64

HAL Pushpak..I-64
Hall Cherokee II (Sailplane)..I-64
Handley Page W.10..I-65
Handley Page H.P.50 Heyford..I-65
Handley Page H.P.67 Hastings..I-65
Handley Page H.P.80 Victor..I-65
Handley Page H.P.81 Hermes..I-65

INDEX (Cont'd) Page

Handley Page H.P.R.7 Herald....................................I-65
Handley Page H.P.137 Jetstream.................................I-66
Hawker Typhoon..I-66
Hawker Siddley Argosy (See Armstrong Whitworth Argosy)..........I-6
Hawker Siddley Harrier..I-66
Hawker Siddley HS 748...I-66
Helio H-250 Courier II..I-66
Helio H-295/H-395 Super Courier.................................I-66
Helio 391 Courier...I-67
Hirth Acrostar..I-67
Howard DGA-15...I-67

Ilyushin Il-62..I-67
Intermount A9A..I-67
Interstate S1B1...I-68

Jodel (See S.A.N. Jodel)..I-94
Junkers F.13..I-68
Junkers Ju 52...I-68

Lake LA-4...I-68
Latecoere 631...I-68
LET L-13 Blanik (Sailplane).....................................I-68
Lockheed Constellation/Super Constellation......................I-68
Lockheed Electra..I-69
Lockheed C-5A Galaxy..I-69
Lockheed Hercules...I-70
Lockheed 18 Lodestar..I-70
Lockheed T-33/TV-2 Silver Star..................................I-70
Lockheed F-104 Starfighter......................................I-70
Lockheed L-1011 TriStar...I-71
LTV A-7 Corsair II (See Vought Corsair II)......................I-104
Luscombe 8..I-71

Martin 2-0-2..I-72
Martin 4-0-4..I-72
Martin B-57...I-72
Maule M-4 Rocket..I-72
Maule M-5 Lunar Rocket..I-72
MBB BO 209 Monsun...I-72
McDonnell F-101 Voodoo..I-72
McDonnell Douglas DC-8..I-73
McDonnell Douglas DC-9..I-73
McDonnell Douglas DC-10...I-73
McDonnell Douglas F-4 Phantom II................................I-74
McDonnell Douglas F-18 Hornet...................................I-74
Meyers 200 (See Aero Commander 200).............................I-1
Meyers MAC 145..I-75
Midget Mustang (See Bushby/Long Midget Mustang)..................I-23
Miles M.65 Gemini...I-75
Mitsubishi MU-2...I-75
Mooney M-18...I-75
Mooney M-20...I-75
Mooney M-21...I-77

INDEX (Cont'd)

Page

Morovan Zlin 326/Z526 .... I-77
Morrisey 2150 (See Varga 2150 Kachina) I-102
Mustang L-2 .... I-77

Navion I-77
Noorduyn Norseman I-78
North American AT-6 Texan/Harvard I-78
North American B-24 Liberator I-79
North American P-51 Mustang I-79
North American F-86 Sabre (FJ Fury) I-79
North American F-100 Super Sabre I-80
North American Sabreliner I-80
North American Rockwell Commander (See Aero Commander) I-1
Northrup F-5 .... I-80
Northrup F-89 Scorpion I-80

Owl Racer I-80

Piaggio P.149 .... I-80
Piaggio P.166 .... I-80
Pietenpol Aircamper I-81
Piper J-3 Cub I-81
Piper J-4 Cub Coupe I-81
Piper PA-12 Super Cruiser I-81
Piper PA-16 Clipper I-82
Piper PA-18 Super Cub I-82
Piper PA-20 Pacer I-83
Piper PA-22 Colt/Tri-Pacer I-83
Piper PA-23 Aztec I-84
Piper PA-24 Commanche I-85
Piper PA-25 Pawnee I-86
Piper PA-28 Cherokee I-88
Piper PA-30 Twin Comanche I-90
Piper PA-31 Navajo/Cheyenne I-91
Piper PA-32 Cherokee SIX I-91
Piper PA-34 Seneca I-92
Piper PA-36 Pawnee Brave I-92
Piper PA-38 Tomahawk I-92
Pitts Special I-93
PZL-102 KOS I-93

R.F.C. Skyrider (Ultralight) I-93
Republic Seabee I-93
Republic F-84 Thunderstreak I-93
Republic F-105 Thunderchief I-93
RLU Breezy I-94
Robin/Centre Est DR 253 Regent I-94
Robin/Centre Est DR 400 .... I-94
Rockwell Commander (See Aero Commander) I-1
Rockwell OV-10 Bronco I-94
Ryan PT-22 .... I-94

S.A.N. Jodel I-94
Saab-Scania 32 Lansen I-94

INDEX (Cont'd)

Page

Saab-Scania 35 Draken........I-95
Saab-Scania AJ-37 Viggen........I-95
Scheibe Bergfalke III (Sailplane)........I-96
Scheibe SF-26 Standard (Sailplane)........I-96
Scheibe Zugvogel (Sailplane)........I-96
Schleicher K 8 (Sailplane)........I-97
Schweizer TSC-1A........I-97
Scottish Aviation Twin Pioneer........I-97
SIAI-Marchetti S.205........I-97
SIAI-Marchetti SF.260........I-97
Smith Aerostar (See Ted Smith Aerostar)........I-101
Snow S-2........I-97
Socata 880/885/892/893/894 Rallye........I-98
Sportavia RF4D Avion-Planeur (Motor Glider)........I-98
Stampe SV-4B........I-98
Stearman Kaydet (See Boeing/Stearman Kaydet)........I-16
Steen Skybolt I........I-98
Stinson A2W........I-99
Stinson 76 Sentinel (L-5)........I-99
Stinson SR-8C Reliant........I-99
Stinson V-77........I-99
Stinson 108........I-99
Stits........I-100
Stolp Starduster........I-100
Sud Aviation (See Aerospatiale)........I-4
Swearingen SA-226 Metro II........I-100

Taylorcraft BC-65........I-101
Ted Smith Aerostar........I-101
Temco D-16........I-101
Thorp T-18 Tiger........I-101
Transavia PL-12 Airtruk........I-101
Travel Air D4000........I-102
Turbulent........I-102

UTVA Weihe (Sailplane)........I-102

Varga 2150 Kachina (Morrisey 2150)........I-102
Vickers Super VC.10........I-102
Vickers Vanguard........I-102
Vickers Viking........I-103
Vickers Viscount........I-103
Vickers-Armstrongs Wellington........I-104
Victa 210 Aircruiser........I-104
Vollmer Sportsman........I-104
Volpar 18 (See Beech 18)........I-7
Vought A-7 Corsair II........I-104

Waco UPF-7........I-105
Whittman Tailwind........I-105

Zlin (See Morovan Zlin)........I-77

Type Unknown (Fixed Wing)........I-105
Type Unknown (Fixed Wing)........I-105

INDEX (Cont'd)

Page

Type Unknown (Fixed Wing Bomber)................................I-105
Type Unknown (Fixed Wing)..I-105
Type Unknown (Fixed Wing)..I-105
Type Unknown (US Medium Patrol Bomber)..........................I-105
Type Unknown (Fixed-Wing, US Navy Attack Aircraft).............I-106
Type Unknown (Fixed-Wing, US Navy Fighter)......................I-106

1.0 INTRODUCTION

In 1980, NRCC began a comprehensive study of aircraft-related incidents involving metal fatigue. It was quickly realized that this was a monumental task because of the large number of examples available. Many of the fatigue "incidents" were not of a serious nature, such as cracks in the wing skin. These cracks usually were found during routine inspections, were easily repairable, and, considering the size of the crack, did not affect the safety of the aircraft. In order to reduce the extent of that survey to a more manageable size, it was decided to limit the study to aircraft accidents that involved fatalities.

The results of that study were reported in References 1 and 2, and the list of accidents covered civil and, to a limited extent, military accidents worldwide for the period 1934 to early 1980. The listing was not complete, as it was difficult to obtain much information on accidents that happened prior to the early 1960s, except for large civil aircraft, for which complete records go back to about 1945. Nonetheless, the survey was able to document a total of 306 accidents, in which a total of 1803 people were killed. The results also showed that worldwide there was at that time an average of 18 fatal aircraft accidents per year resulting from metal fatigue.

There were many cases where significant accidents were omitted from the survey because no fatalities occurred, either through good fortune, or through excellent piloting skill. An example of the former was the fatigue fracture of the aft cabin pressure bulkhead of an Air Canada DC-9 on September 17, 1979 (Ref. 3). The tailcone along with the aft cabin pressure access door and a portion of the aft cabin pressure bulkhead separated from the aircraft, causing rapid decompression of the passenger and flight-crew compartments. An example of exceptional piloting skill preventing a fatality was the failure of a lower-wing spar on a Zlin during an aerobatic flight in the U.K on 3 June 1970 (Ref. 4). The wing failed, although it remained attached in such a way that it would only support airloads during inverted flight. The pilot, Neil Williams of the British aerobatic team, flew the aircraft inverted until just above the runway, then rolled the aircraft so that it crash-landed on the runway. Although the aircraft was a complete write-off, Mr. Williams was unhurt. Accidents such as these should be included in any comprehensive survey of fatigue fracture in aircraft.

Another shortcoming of the initial survey was that only three landing-gear failures to fixed-wing aircraft were included, whereas anyone reading through accident reports will note that a large number of fatigue failures involve the landing gear. These accidents, however, are seldom fatal.

In order to cover cases like this, the survey has been expanded to include accidents involving either

- a fatality,
- substantial damage to the airframe, or
- aircraft destroyed.

Accidents are included in the survey if fatigue fracture was somehow involved, although not necessarily as the primary cause of the accident. For example, the survey includes the 25 May 1979 crash at Chicago of a

DC-10, following separation of an engine from the wing. In that case, the probable cause was determined to be maintenance-induced damage to the engine pylon during installation of the engine (Ref. 5). This accident is included in the survey (Appendix H, item H33), because the pylon crack, though caused by a maintenance error, propagated by fatigue during the 24 days between the engine change and the crash.

Another example is the Boeing 707 tail-fin failure at Mount Fuji, Japan, on 5 March 1966 (Ref. 6). The probable cause was attributed to the sudden encounter of abnormally severe turbulence, which imposed a gust load considerably in excess of the design limit. The accident is included (item B14, Appendix B), because fatigue cracks were found in the vertical-stabilizer rear-spar attachment fitting, and tests on a similar fitting with cracks of that size failed at 110% of the limit design fin gust load, well below the design ultimate load.

The results of the survey are given in two parts:

- Volume 1 - fixed-wing aircraft (this report),
- Volume 2 - rotary-wing aircraft (Ref. 7).

The complete survey covers both fixed-wing aircraft and helicopters, and lists 1885 accidents since 1927, involving 2240 fatalities.

This volume (fixed-wing aircraft) lists 1466 accidents, which have resulted in 1861 fatalities. The accidents are listed two ways, first by type of failure, such as wing or tail failure, and secondly by aircraft type.

It should be noted that this survey cannot be claimed to be comprehensive, and is restricted to the sources listed in Section 3. The survey does, however, indicate the magnitude of the fatigue problem.

There are other considerable costs, besides fatalities, that are attributable to metal fatigue, and are not covered by this survey. These costs include:

- cost of inspections required to detect cracks in known areas prone to fatigue cracking;

- cost of replacing components known to be fatigue-critical, and which have a safe life much shorter than the airframe as a whole (such as main and tail rotor blades);

- cost of down-time when a fleet is grounded because of the unexpected discovery of a fatigue crack in a critical region.

- cost of repairs or strengthening of an area found to be fatigue-prone.

- loss of operational capability (including the reduced ability to defend one's country) when a fighter or bomber fleet is grounded for inspections and possibly repairs, following the unforseen discovery of a fatigue crack in a critical area.

How to Use This Report

Fixed-wing accidents are covered in Volume 1 (this volume), while for rotary-wing accidents, refer to Volume 2 (Ref. 7).

In this report, the information is presented a number of different ways:

(1) For a listing of accidents by major component or system, see the following Appendices:

- wing	Appendix A
- tail	Appendix B
- fuselage	Appendix C
- flight controls	Appendix D
- engine or transmission	Appendix E
- propeller	Appendix F
- landing gear	Appendix G
- miscellaneous	Appendix H

(2) For a listing of fatigue failures experienced by a particular aircraft type, see Appendix I ("LIST OF FIXED-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE"). A summary of repeated fatigue failures is found in Table 2 ("LIST OF REPEATED FATIGUE FAILURES - FIXED-WING").

(3) To find out what accidents occurred in a particular country, or belonging to a particular military service, see the cross-reference listing in Table 5 ("LIST OF ACCIDENTS BY COUNTRY - FIXED-WING") and use the identification number to find the corresponding accident in Appendices A through H.

(4) To find out accidents occurring from a particular form of crack initiation (for example "fretting"), look up the cross-reference list in Table 4, and use the identification number to find the accident in Appendices A through H.

2.0 DEFINITIONS AND ABBREVIATIONS

Whether to call a structural failure an "incident" or an "accident" can sometimes be a problem. For example, if a main spar fails on an aircraft having a multi-spar wing, and the damage is detected during the post-flight inspection, the case would be considered an "accident". But suppose in the same instance, the damage was not discovered until several months later, as in the case of the Vickers Viking in 1951 (item A32 in Appendix A)? In that case, a "bang" was heard during the flight, but no damage could be found in the post-flight inspection. It was not until three months later that the centre-section spar boom was found to be completely severed (Ref. 8).

The approach used in this report is to adopt the definitions used by the International Civil Aviation Organization (Ref. 9):

"Aircraft Accident: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all persons

> have disembarked, in which:
>
> (a) any person suffers death or serious injury as a result of being in or upon the aircraft by direct contact with the aircraft or anything attached thereto, or
> (b) the aircraft receives substantial damage.
>
> Substantial Damage: Damage or structural failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft and which would normally require the major repair or replacement of the affected component. The following types of damage are specifically excluded: engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, taxiing damage to propeller blades, damage to tires, engine accessories, brakes, or wing tips."

In the example of the Vickers Viking given above, the item was included in the survey as an accident, by virtue of the above definition of substantial damage. An example of an incident would be the loss of one of the small trailing-edge foreflaps of a jumbo jet.

List of Abbreviations Used

The following abbreviations have been used in this report:

AA	Administration de l'Aeronautique (Belgium).
AD	Airworthiness Directive.
AF	Air Force.
AFFDL	US Air Force Flight Dynamics Laboratory.
ARC	UK Aeronautical Research Council.
ARL	Australian Aeronautical Research Laboratories.
ASTM	American Society for Testing and Materials.
AWST	"AVIATION WEEK & SPACE TECHNOLOGY" magazine.
AW	"AVIATION WEEK" magazine.
BoA	Board of Aviation.
BoT	Board of Trade.
CAA	UK Civil Aviation Authority.
CAB	US Civil Aeronautics Board.
CF ACAIRS	Canadian Forces Aircraft Accident Reporting System (a computer storage/retrieval system for accident data).
D	Destroyed.
Dam	Damage to the airframe.
DoT	Department of Transport.
FI	"FLIGHT INTERNATIONAL" magazine.
ICAF	International Committee on Aeronautical Fatigue.
ICAO	International Civil Aviation Organization.
ICAO AAD	ICAO "AIRCRAFT ACCIDENT DIGEST".
ICAO ADREP	ICAO Accident Data Report (a computer storage/retrieval system for accident data).
MLG	Main landing gear.
MoT	Ministry of Transport (Canada).
NBS	US National Bureau of Standards.
NTSB	National Transportation Safety Board (USA).
NTSB AAR	NTSB Aircraft Accident Report.
NZ AAR	New Zealand Aircraft Accident Report.
NZ AIB	New Zealand Accident Investigation Bureau.

RAN	Royal Australian Navy
RAAF	Royal Australian Air Force
RAF	Royal Air Force, UK
S	Substantial damage to the airframe.
UK	United Kingdom.
USAF	United States Air Force.
WAAS	"WORLD AIRLINE ACCIDENT SUMMARY" (Ref. 10).
WADC	Wright Air Development Centre

3.0 SOURCES OF INFORMATION

The following sources were used for information on fatigue-related accidents:

World-Wide Civil Accidents

1. "WORLD AIRLINE ACCIDENT SUMMARY" (Ref. 10). This reference, which is updated several times per year, lists all civil aircraft accidents that have occurred since 1946. Only fixed-wing aircraft over 5700 kg (12,500 lb) maximum gross weight are covered.

2. International Civil Aviation Organization (ICAO). ICAO has a computer data-bank of all civil aircraft accidents for 1970 and onwards. The data-bank covers all civil aircraft, both fixed-wing and helicopter, whose gross weight is over 2250 kg (4960 lb).

3. Magazines, such as "AVIATION WEEK & SPACE TECHNOLOGY", "FLIGHT INTERNATIONAL", and "INTERNATIONAL HELICOPTER".

4. Mann's bibliographies on the fatigue of materials (Refs. 11 and 12), and Anderson's review paper on the fatigue of aircraft structures (Ref. 13) provided references to much of the data available in the published literature. Anderson's paper, in addition, lists some service fatigue experiences for the period from early in World War II until 1970.

Also, all the member countries of ICAO were queried for civil accident information, and National Delegates from the International Committee on Aeronautical Fatigue were asked to obtain whatever information was openly available from the military authorities in their country. The following countries provided information for the periods indicated:

CIVIL

Argentina
Australia (1969 - mid-1981)
Barbados
Belgium (1950 - mid-1981)
Brazil
Burma
Canada (1916 - mid-1982)
Cape Verde
Cyprus
Egypt
Finland (1962 - Jan. 1982)
Federal Republic of
  Germany (1975 - Aug. 1981)

MILITARY

Royal Australian Air Force (1953 - 1981)
Royal Australian Navy (1959 - 1981)
Belgian Air Force (to mid-1981)
Canadian Forces (1950 - early 1981)
Swedish Air Force (1967 - Aug. 1981)
UK - Royal Air Force
US Army (1972 - Mar. 1981)

Greece
Guyana
Hong Kong
Iceland
Iraq
Ireland
Jamaica (1966 - 1981)
Japan (1973 - Feb. 81)
Kenya
Lethoso
Malaysia
Malawi
Malta
Mexico
Netherlands
New Zealand
Norway
Pakistan
Papua New Guinea
Portugal
Rwanda
Seychelles
South Africa (to April 1981)
Sweden
Switzerland
Thailand
USA (1964 - late 1981)

Data on accidents prior to the introduction of the ICAO reporting system in the late 1940s are very difficult to obtain. Details of accidents to aircraft below 2250 kg (4960 lb) gross weight (the lower limit for which accidents are reported to ICAO) are scarce prior to the mid 1960s, when countries began transferring to computer storage and retrieval of accident data.

Even for cases where accident data are available, particularly prior to the 1950s, often the accident cause does not specifically mention fatigue. The cause will be listed as "failure of component", rather than "fatigue-failure of component". This is particularly true for failures involving engine components, and it is quite possible that the number of engine-related accidents has been understated in this survey.

There are almost no accident data available from communist countries, as they do not divulge accident data, not even to ICAO.

Because of security reasons, only six countries were able to provide data on accidents to military aircraft. The few examples from other countries included in this report were obtained from news reports and trade publications.

4.0 RESULTS

The results of the survey are summarized in Table 1. A total of 1466 fixed-wing accidents were found, resulting in 1861 fatalities. Including the rotary-wing accidents from Volume 2 of this survey (Ref. 7) gives a combined fixed-wing and rotary-wing total of 1885 accidents and 2240 fatalities. A total of 393 fixed-wing and 165 rotary-wing aircraft were destroyed.

For fixed-wing aircraft, failure of the landing gear was the most common fatigue problem, and accounted for 37% of the accidents. A landing-gear failure is, however, seldom a fatal accident, as only 5 of the 542 landing-gear accidents (1%) resulted in a fatality.

Following close behind were engine/transmission failures (28% of the fixed-wing accidents), and propeller failures (16%).

4.1 Listing of Accidents

Where possible, the following information is given in the listings for each accident:

- Aircraft type
- Aircraft operator (private aircraft excepted)
- Accident date
- Damage to airframe ("D" = destroyed, "S" = substantial)
- Number of fatalities
- Geographical location of the accident
- A brief description of the location of the fatigue failure
- A reference to the accident report number, or where information on the accident was obtained. (To conserve space, references are only given in the listing by accident type).

Each accident has been assigned an identification number for cross-referencing purposes. The identification number consists of a letter, corresponding to the Appendix in which the accident is listed, and a number, referring to the number of the accident within the Appendix. For example, the identification number A39 refers to the 39th accident listed in Appendix A (fixed-wing aircraft, wing failure).

4.1.1 Listing of Accidents by Failure Type

The listing of fixed-wing accidents according to failure type is found in Appendices A through H.

Three of the wing failures in the United States are included, although it was not possible to verify them officially, because they occurred prior to the introduction of the National Transportation Board's computer-based data bank. These accidents are for the Cessna 140 (1956, item A48 in Appendix A), and the Cessna 195 (1960, item A57, and 1963, item A66). Similarly, no detailed information is available on the wing failures of the Wellington Bomber (items A4 to A23) during World War II.

The earliest reported accident was the 1927 wing-failure in Germany of a Dornier Merkur, a single-engined, six-passenger airliner belonging to Luft Hansa (item A1). The wing strut failed close to the upper attachment point (Refs. 14, 15, & 16).

As a point of interest, failures of the left and right wings occurred about equally, with 32 of the failures being of the port wing, and 34 of the starboard wing.

It should be noted that the number of wing accidents (137) is somewhat biased by the 20 wing failures of the Wellington bomber in the 1942 to 1944 period (items A4 to A23).

4.1.2 Listing of Accidents by Aircraft Type

The listing of accidents by aircraft type is given in Appendix I. Even the venerable DC-3 has not been immune to fatigue problems, and three DC-3 wing failures are included. That number is, however, only a very small percentage of the approximately 10,000 DC-3/C-47 aircraft that were manufactured.

Ten accidents occurred for which the aircraft type was not specified. These are listed at the end of Appendix I under the headings "Type Unknown". The authors welcome any further information on these accidents.

4.2 List of Repeated Failures

Table 2 lists fixed-wing aircraft that have had more than one serious accident resulting from metal fatigue of the same general area. (There is a similar list for rotary-wing aircraft in Reference 7.) Unfortunately, there was generally insufficient information available to determine if these failures were in precisely the same part and location.

The ordering of the list is by number of accidents. For additional information on individual accidents, refer to the corresponding identification numbers in Appendices A through H.

In searching for repeated fatigue failures, it is advised also to check the aircraft type under Appendix I ("Listing of Accidents by Aircraft Type"), as some accidents have insufficient information to pinpoint the exact failure location, so additional failures may appear in that Appendix that do not show up in Table 2.

Some examples of repeated failures are:

Aircraft	No. of Accidents	Failure Area
Cessna 182	21	Nose gear fork
Vickers-Armstrongs Wellington	20	Wing spar boom
Mooney M-20	15	Propeller blade
Piper PA-28 Cherokee	14	Propeller blade
Boeing Stearman	12	Propeller blade
Grumman AgCat	11	Main landing gear
Cessna 180	10	Main landing gear leg (at axle attachment bolt holes)

It is beyond the scope of this report to examine each of the cases of repeated failure in order to determine which are still on-going and have not had sufficient action taken in order to arrest the problem. An examination of the Airworthiness Directives for the aircraft in question would be required, as well as a detailed review of the accident reports to determine if the accident was not simply a result of inadequate maintenance by the operator. Examples of recent fatigue failures that have occurred at least four times in the past include:

AIRCRAFT	FAILURE AREA	NO. OF ACCIDENTS	DATES
Aero Commander S-2R	Engine cylinder	4	1974-81
Beech Bonanza	Propeller blade	4	1967-80
Beech Baron/Cochise	Propeller hub	5	1974-81
Cessna 140	Main landing gear (bolt hole at step attach point)	4	1964-81
Cessna 150	Propeller blade	6	1967-80
Cessna 150	Engine cylinder	5	1968-81
Cessna 150	Nose gear fork	4	1964-80
Cessna 170	Main landing gear axle	7	1966-81
Cessna 172	Propeller blade	6	1970-81
Cessna 180	Main landing gear leg (at axle attachment bolt holes)	10	1959-81
Cessna 180	Main landing gear leg (at fuselage)	8	1959-80
Cessna 185	Propeller blade	5	1964-80
Cessna 185	Outer main landing gear support bracket	5	1976-81
Douglas B-26 Invader	Wing spar	4	1964-80
Grumman AgCat	Engine cylinder	4	1968-80
Mooney M-20	Propeller blades	15	1965-80
Piper PA-25 Pawnee	Wing	5	1967-80

Some of these problems have been on-going for a number of years, as for example the two problem areas in the Cessna 180 main landing gear leg.

4.3 Breakdown of Accidents by Year

Table 3 gives a yearly breakdown of the type of fatigue failures that have occurred in fixed-wing aircraft.

The total number of reported fixed-wing plus rotary-wing accidents occurring in each year is plotted in Figure 1. The big increase in the mid-1960s is the result of improved availability of accident information with the introduction of computer-based information systems in a number of countries (particularly the introduction of the US National Transportation Safety Board system in 1964). Over the last five years there has been an average of 100 fatal accidents (fixed-wing plus rotary-wing) per year resulting from metal fatigue.

The number of fixed-wing accidents for each year is plotted in Figure 2. An average of 69 serious fatigue accidents per year have occurred over the past five years. The numbers of rotary-wing accidents are shown in Figure 3.

Figure 4 shows the breakdown of fixed-wing accidents by failure type. Failures in the wing primary structure have occurred fairly consistently since the early 1950s, and are still a problem, as the latest five-year average is about three per year. Since 1976, engine/transmission fatigue failures have been the most common accident cause, with 26 accidents per year on average. Prior to that time, landing gear failures were the most common accident, with a peak of 58 accidents reported in 1965, but landing-gear failures have dropped to about 20 per year recently. As pointed out by Buxbaum (Ref. 17), the loads seen by a landing gear are very complex, and it is apparent, from the number of accidents, that landing gears have been under-designed in the past.

Propeller failures have a five-year average of 11 accidents per year. Most of the current propeller problems are for light aircraft, and many of these fatigue failures initiate from dents, nicks, or pits, which should be detectable by the pilot during his pre-flight inspection. Propeller failures were a common problem in the 1930s, but no specific details are available. Reference 18 reports the following numbers of propeller failures for US aircraft. It is not known how many of these were attributable to fatigue, although the report indicates that vibratory stresses were the main cause.

Year	No. of propeller failures
1931	37
1932	41
1933	34
1934	13
1935	8
1936	11
1937	15
1938	23
1939	6
1940	0

The introduction of vibration dampeners after 1938 considerably reduced the number of propeller problems, as the above table shows.

4.4 Initiation Sites

The fatigue-crack initiation sites for the fixed-wing accidents are listed in Table 4. The identification numbers that are given can be used to look up the corresponding accident in Appendices A through H. Some failures are listed under more than one cause. For example, accident A122 in Appendix A was initiated by a corrosion pit in the bore of a bolt hole, so the accident is listed in Table 4 under "Fastener Hole", as well as "Corrosion". The initiation sites are summarized as follows:

INITIATION SITE	NO. OF ACCIDENTS
Bolt, Stud or screw	108
Fastener hole or other hole	72
Fillet, radius, or sharp notch	57
Weld	53
Corrosion	43
Thread (other than bolt or stud)	32
Manufacturing defect	27
Scratch, nick, or dent	26
Fretting	13
Surface or subsurface flaw	6
Improper heat treatment	4
Maintenance-induced crack	4
Work-hardened area	2
Wear	2

The above total does not equal the number of accidents in the survey, since information about the initiation site is unavailable in many cases.

4.5 Listing of Accidents by Country

Table 5 gives a cross-reference list of accidents by the country of occurrence. The identification numbers that are given can be used to look up the accident in Appendices A through H. The cross-reference list is in two parts - civil aircraft, and military aircraft. For military aircraft, the accidents are listed by owner (i.e., Canadian Forces), rather than by country of occurrence.

5.0 CONCLUSIONS

1. Although this survey does not claim to be comprehensive, a total of 1885 fixed-wing and rotary-wing aircraft accidents involving fatigue fracture since 1927 are covered by this survey. These accidents claimed 2240 fatalities worldwide. Furthermore, serious fatigue-related accidents are still occurring at a rate of about 100 per year.

2. Fixed-wing aircraft accounted for 1466 accidents and 1861 fatalities. Recently, there has been an average of about 61 fixed-wing fatigue accidents per year.

3. For fixed-wing aircraft, failure of the landing gear has been the most common fatigue problem over the years, accounting for 37% of the accidents. However, a landing-gear failure is only fatal about 1% of the time.

4. The common causes of fixed-wing fatigue failures over the past few years have been engine failure/transmission failure (averaging 26 per year), landing gear (20 per year), propeller failure (11 per year), and the wing primary structure (three per year).

5. Many of the propeller problems occur for light aircraft, and initiate from nicks or dents on the blade. This type of damage should be noticed by the pilot during his pre-flight inspection.

6. There are many cases of repeated accidents from the same cause. Seventeen examples are given of fixed-wing aircraft that have had at least four fatigue failures, one of which was recent. A more thorough review of the accident reports and Airworthiness Directives would be required in order to determine which of these problems are still on-going and have not had sufficient action taken in order to arrest the problem.

7. The five most common initiation sites for fatigue cracks that have resulted in fixed-wing accidents are:
(1) bolt, stud, or screw,
(2) fastener hole or other hole,
(3) fillet, radius, or sharp notch,
(4) weld, and
(5) corrosion.

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TABLE 1

SUMMARY OF SERIOUS ACCIDENTS - FIXED-WING

CATEGORY	NO. ACCIDENTS	NO. AIRCRAFT DESTROYED	NO. FATALITIES
FIXED-WING AIRCRAFT			
Landing Gear	542	9	21
Engine or Transmission	408	144	536
Propeller Failure	232	52	162
Wing	137	119	400
Flight Controls	48	28	68
Tail	37	21	244
Miscellaneous	37	11	285
Fuselage	25	9	145
	----	----	----
FIXED-WING TOTALS	1466	393	1861
ROTARY-WING TOTALS	419	165	379
	----	----	----
OVERALL TOTALS (FIXED-WING + ROTARY-WING)	1885	558	2240

TABLE 2

LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

(Note: failure may not be in exactly same part)

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
Cessna 182	21	Nose gear fork	1964-75	G46 G59 G72 G82 G93 G109 G113 G115 G120 G124 G144 G151 G177 G186 G192 G197 G198 G208 G225 G239 G388
Vickers-Armstrongs Wellington	20	Wing spar boom	1942-44	A4-A23
Mooney M-20	15	Propeller blade	1965-80	F26 F34 F47 F52 F62 F69 F72 F83 F90 F91 F128 F133 F138 F200 F223
Piper PA-28 Cherokee	14	Propeller blade	1964-79	F21 F33 F38 F39 F80 F93 F99 F119 F152 F180 F190 F197 F206 F213
Boeing Stearman	12	Propeller blade	1965-76	F31 F42 F44 F50 F59 F77 F78 F82 F104 F140 F150 F176
Grumman AgCat	11	Main landing gear	1964-76	G67 G170 G188 G232 G302 G311 G312 G347 G383 G414 G427
Cessna 180	10	MLG leg (at axle attachment bolt holes)	1959-81	G13 G17 G110 G167 G181 G207 G270 G276 G465 G537
Beech 35/36 Bonanza	9	Crankshaft	1971-79	E158 E183 E222 E256 E289 E321 E343 E344 E345
Beech 18	8	Wing	1947-73	A27 A75 A78 A79 A82 A102 A107 A110
Cessna 172	8	Nose gear fork	1964-70	G61 G100 G106 G107 G147 G175 G220 G278
Cessna 180	8	MLG leg (at fuselage)	1959-80	G15 G26 G33 G47 G146 G462 G484 G497
Cessna 170	7	MLG axle	1966-81	G193 G216 G305 G399 G451 G513 G533
Cessna 180	7	MLG leg (location unspecified)	1959-77	G12 G327 G365 G389 G395 G428 G441

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
Cessna 150	6	Propeller blade	1967-80	F55 F75 F135 F212 F216 F218
Cessna 172	6	Propeller blade	1970-81	F89 F94 F115 F121 F203 F228
Cessna 180	6	Propeller blade	1961-75	F11 F24 F40 F87 F88 F144
Cessna A188	6	MLG leg	1969-79	G245 G264 G296 G362 G461 G481
Cessna 210	6	Crankshaft	1976-79	E254 E262 E282 E299 E303 E347
Champion Citabria	6	MLG attach bolt	1970-76	G279 G290 G307 G321 G338 G436
Beech 18	5	Propeller blade	1964-77	F20 F23 F45 F141 F188
Beech Baron/Cochise	5	Propeller hub	1974-81	F131 F181 F182 F221 F232
Cessna 150	5	Engine cylinder	1968-81	E101 E329 E335 E380 E401
Cessna 185	5	Propeller blade	1964-80	F16 F53 F106 F149 F219
Cessna 185	5	Outboard MLG support bracket	1976-81	G416 G496 G499 G500 G525
Cessna 210	5	Propeller blade	1964-78	F15 F74 F130 F136 F195
Cessna 210	5	MLG actuator spindle shaft	1966-78	G160 G195 G298 G340 G455
Piper PA-25 Pawnee	5	Wing	1967-80	A83 A108 A109 A111 A131
Saab-Scania Draken	5	Compressor blade	1967-75	E93 E127 E136 E185 E232
Aero Commander S-2R	4	Engine cylinder	1974-81	E216 E393 E396 E400
American AA-1	4	Propeller blade	1971-76	F95 F117 F147 F169
Beech 35 Bonanza	4	Propeller pitch-change bolts	1967-75	F64 F85 F110 F151
Beech Bonanza	4	Propeller blade	1967-80	F60 F134 F191 F222
Beech Musketeer/Sundowner	4	Propeller blade	1966-77	F37 F56 F161 F184
Boeing Stearman	4	Crankshaft (thrust nut area)	1964-69	E39 E44 E85 E117
Cessna 140	4	MLG (bolt hole at step attach point)	1964-81	G45 G215 G261 G539
Cessna 150	4	Nose gear fork	1964-80	G58 G117 G234 G515
Cessna 172	4	Engine cylinder	1966-79	E83 E179 E304 E330
Cessna 180	4	MLG attach bolt	1964-79	G71 G187 G285 G480
Cessna 182	4	Propeller blade	1974-77	F142 F171 F177 F187
Cessna 195	4	MLG leg	1967-75	G222 G252 G262 G412
Cessna 210	4	MLG saddle assembly	1969-78	G244 G417 G425 G457
Cessna 310	4	Propeller hub	1968-76	F76 F124 F163 F174
Curtiss C-46	4	Hold-down studs of engine cylinder	1956-65	E6 E23 E24 E59

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS			
Douglas B-26 Invader	4	Wing spar	1964-80	A70	A71	A74	A134
Douglas DC-6	4	Propeller blade	1950-76	F5	F10	F17	F165
General Dynamics F-111A	4	Tailplane actuator assembly	1968	D15	D16	D17	D18
Grumman AgCat	4	Engine cylinder	1968-80	E107	E190	E302	E356
Transavia Airtruk	4	Nose landing gear	1970-74	G265	G318	G339	G364
Aero Commander 560/680	3	Wing spar cap	1961-67	A62	A73	A81	
Aero Commander 500	3	Propeller hub	1971-73	F98	F102	F122	
Beech 35 Bonanza	3	Wing centre-section truss	1961-63	A61	A63	A68	
Boeing B-47	3	Wing (longeron)	1958	A53	A54	A55	
Boeing B-52	3	Wing	1953?-61?	A39	A40	A60	
Boeing B-52	3	Fuselage	1961-63	C10	C11	C12	
Boeing 727	3	Main landing gear trunnion support beam	1970-71	G282	G291	G304	
Bristol 170	3	Wing	1953-57	A43	A47	A51	
CallAir/Aero Commander A-9	3	Crankshaft	1969-73	E114	E157	E188	
Cessna 140	3	MLG axle	1965-76	G99	G263	G423	
Cessna 177	3	Propeller blade	1975-78	F154	F155	F202	
Cessna 182	3	Nosewheel shimmy dampener support bracket	1964-67	G53	G191	G226	
Cessna 185	3	Mixture-control valve shaft in air intake box	1977-80	D297	E306	E360	
Cessna A188	3	Propeller hub	1973-81	F118	F145	F230	
Cessna A188	3	MLG bolt	1971-74	G297	G341	G375	
Cessna 206	3	Crankshaft	1973-81	E189	E226	E378	
Cessna 206	3	Propeller hub	1968-81	F68	F125	F229	
Cessna 206	3	Propeller blade	1968-81	F67	F112	F227	
Cessna 402	3	Exhaust manifold system	1975-78	E233	E295	E318	
Champion Citabria	3	MLG axle	1970-81	G287	G469	G522	
Champion Citabria	3	MLG leg strut attachment	1975-82	G398	G446	G540	
de Havilland Dove	3	Wing	1951-71	A33	A92	A98	
DHC-2 Beaver	3	Wing strut attachment fitting	1963-81	A69	A76	A136	
Douglas DC-3	3	Wing	1968-73	A85	A104	A106	
Douglas DC-3	3	Engine cylinder	1946-64	E2	E3	E38	
Douglas DC-3	3	MLG brace strut fitting	1959-64	G10	G24	G74	
Douglas DC-6	3	NLG upper torque link	1965-80	G121	G283	G505	
Fokker F-27	3	Engine, low-pressure impeller	1972-79	E177	E203	E331	
Lockheed Constellation	3	Propeller blade	1947-53	F3	F4	F8	
McDonnell Douglas F-4	3	Wing skin	1969-70	A90	A93	A94	

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
McDonnell Douglas F-4	3	Stabilator	pre-1972	B19 B20 B21
Mooney M-20	3	Propeller hub	1967-76	F48 F51 F162
N. American F-86 Sabre/FJ-4 Fury	3	Wing	1954-59?	A44 A45 A46
Piper PA-22	3	Nose gear mount/ support tubes	1965-78	G111 G156 G467
Piper PA-25 Pawnee	3	MLG shock strut	1964-74	G57 G84 G377
Piper PA-28 Cherokee	3	Exhaust valve	1976-81	E267 E388 E392
Piper PA-28 Cherokee	3	MLG torque link	1972-81	G323 G325 G527
Piper PA-32 Cherokee SIX	3	Engine cylinder	1974-81	E221 E308 E402
Saab-Scania Draken	3	Turbine disc	1977-79	E298 E310 E341
Saab-Scania Viggen	3	Wing spar	1974-75	A113 A115 A116
Snow S-2	3	Connecting rod	1971-75	E159 E176 E241
Snow S-2	3	Propeller blade	1966-71	F43 F65 F100
Stinson 108	3	Engine cylinder	1964-79	E31 E187 E332
LTV A-7 Corsair II	3	Engine spacer collar	1972	E161 E162 E163
Aero Commander 100	2	Propeller	1973-75	F123 F146
Aero Commander 112	2	Propeller	1975-76	F159 F178
Aero Commander 500	2	Propeller blade	1976-78	F172 F192
Aero Commander 520	2	Nosewheel fork	1964-66	G73 G194
Aero Commander 690	2	Torque link shaft	1979-80	G475 G511
Aero Commander S-2R	2	Propeller blade	1978-79	F194 F211
Aerospatiale Caravelle	2	Nose wheel axle	1964-66	G50 G185
Avro CF-100 Canuck	2	Flap hinge bracket	1954-56	D2 D3
Beech 58 Baron	2	Crankshaft	1976-79	E266 E326
Beech 58 Baron	2	Landing gear retract ball end	1975-78	G393 G453
Beech 35 Bonanza	2	Conrod bolt	1974	E212 E224
Beech 35 Bonanza	2	Cylinder hold-down studs	1971-77	E153 E285
Beech 35 Bonanza	2	Nose gear actuator retract arm	1964-67	G62 G223
Beech Queen Air	2	Crankshaft	1976-77	E265 E287
Boeing 377 Stratocruiser	2	Propeller	1952-55	F6 F9
Boeing 707/720	2	Fan disc	1965-71	E50 E149
Boeing 707	2	Nose gear outer cylinder	1973-75	G350 G394
Boeing 707	2	Landing gear axle	1964-65	G90 G112
CallAir/Aero Commander A-9B	2	Conrod	1971-74	E146 E206
Cessna 150	2	Rudder	1962-68	B11 B16
Cessna 150	2	Left gear spring assembly	1964-65	G92 G134
Cessna 172	2	Aileron push-pull rod	1965-71	D11 D21
Cessna 172	2	Engine mixture control wire	1971-81	E151 E403
Cessna 175	2	Nose wheel fork	1964-68	G80 G227

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
Cessna 182	2	Master & connecting rods	1964	E33 E37
Cessna 185	2	Crankshaft	1966-76	E77 E259
Cessna 185	2	MLG leg (at axle attachment)	1971-77	G306 G452
Cessna 195	2	Wing carry-through	1960-63	A57 A66
Cessna 206	2	Cylinder head	1969-79	E111 E324
Cessna 210	2	Connecting rod	1965-75	E57 E240
Cessna 210	2	Cylinder hold-down studs	1976-80	E273 E361
Cessna 310	2	Propeller blade	1967-72	F58 F114
Cessna 336	2	Propeller blade	1968-76	F70 F168
Convair 580	2	Nose gear drag strut	1973-79	G352 G477
Convair 600	2	Nose gear piston rod	1969-72	G257 G324
de Havilland Comet I	2	Fuselage at ADF window	1954	C6 C7
DHC-2 Beaver	2	Engine cylinder	1979-80	E338 E363
DHC-3 Otter	2	MLG attachment bolt	1967-77	G217 G445
Grumman AgCat	2	Crankshaft	1973-80	E192 E362
Grumman Mallard	2	Hydraulic line	1964	H4 H5
Handley Page Hastings	2	Elevator outer-hinge bolt	1953-65	B8 B13
Handley Page Hermes	2	Crankshaft web	1952	E8 E9
Helio H-295	2	Wing attach fitting	1971-78	A100 A122
Lockheed Constellation	2	MLG strut cylinder	1960	G19 G20
Lockheed Constellation	2	Nose gear actuating strut	1964	G49 G76
Lockheed C-5A	2	Engine compressor rear frame	1982	E406 E407
Lockheed F-104	2	Wing	pre-1969-71	A89 A97
Luscombe 8A	2	Landing gear bolt	1966-68	G179 G236
Luscombe 8A	2	Landing gear attachment	1973-75	G361 G411
Maule M-4	2	Landing gear shock strut	1965	G116 G123
Douglas DC-8	2	MLG bogie beam	1969-80	G260 G517
McDonnell Douglas F-4	2	Wing lock lug	1973-76	A105 A118
Mooney M-21	2	Propeller blade	1964	F18 F19
Noorduyn Norseman	2	Wing strut eyebolt	1958-63	A56 A67
N. American F-100	2	Wing	1967-68	A84 A86
Northrup F-89 Scorpion	2	Wing	1952	A36 A37
Piper J-3 Cub	2	Wing strut fitting	1947-79	A26 A126
Piper J-3 cub	2	Landing gear float attachment	1965-80	G136 G506
Piper PA-18 Super Cub	2	Propeller blade	1975-78	F148 F205
Piper PA-18 Super Cub	2	Landing gear axle	1966-71	G182 G315
Piper PA-22	2	Wing lift-strut fork	1972-80	A103 A129

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - FIXED-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
Piper PA-22	2	Nosewheel assembly	1974-81	G384 G521
Piper PA-22	2	MLG at weld	1964-76	G65 G419
Piper PA-23 Aztec	2	Prop mounting stud	1967-76	F49 F175
Piper PA-23 Aztec	2	MLG drag link bolt	1976-81	G420 G518
Piper PA-23 Aztec	2	NLG upper drag link	1969-74	G251 G373
Piper PA-24 Commanche	2	Crankshaft	1980-81	E372 E377
Piper PA-24 Commanche	2	Nose gear drag link clevis	1964	G85 G94
Piper PA-25 Pawnee	2	Mixture-control part	1968-71	E106 E141
Piper PA-25 Pawnee	2	Crankshaft	1973-75	E193 E245
Piper PA-25 Pawnee	2	MLG brace tube	1970-72	G268 G320
Piper PA-28 Cherokee	2	Connecting rod	1968-73	E100 E182
Piper PA-28 Cherokee	2	Crankshaft	1971-80	E148 E350
Piper PA-28 Cherokee	2	Engine cylinder	1977-78	E278 E313
Piper PA-28 Cherokee	2	MLG torque link bolt	1977	G440 G442
Piper PA-30 Twin Commanche	2	Propeller blade	1969-71	F86 F101
Piper PA-31 Navajo	2	Propeller blade	1973-79	F126 F208
Piper PA-31 Navajo	2	Hinge on right gear door	1976-80	G418 G503
Piper PA-32 Cherokee SIX	2	Crankshaft	1976-81	E255 E398
Piper PA-32 Cherokee SIX	2	Prop pitch-change dowel	1974-75	F132 F158
Piper PA-36-375 Pawnee Brave	2	MLG leg (radius outboard of fuselage)	1981	G532 G531
Republic F-105	2	Fuselage	1964-65	C13 C15
Saab-Scania Lansen	2	Fuel pipe	1970-72	E135 E166
Scottish Aviation Twin Pioneer	2	Wing V-brace strut	1957	A50 A52
Stinson 108	2	Exhaust valve	1965	E55 E60
Stinson 108	2	Crankshaft	1976-80	E258 E359
Stinson 108	2	Propeller blade	1964-65	F22 F32
Stinson 108	2	Tail wheel attach tubing	1965-67	G126 G205
Stits	2	Horizontal stabilizer attachment	1967-73	B15 B23
Transavia Airtruk	2	Propeller blade	1972-76	F113 F166
Transavia Airtruk	2	MLG attach lugs	1972-79	G317 G473
LTV A-7 Corsair II	2	Nose gear strut	1971	G294 G295
Attack-type US Navy aircraft	2	Wing	approx 1950	A29 A30

TABLE 3

BREAKDOWN OF ACCIDENT TYPES BY YEAR OF ACCIDENT - FIXED-WING

YEAR	WING	TAIL	FUSELAGE	FLIGHT CONTROLS	ENGINE/ TRANSMN	PROP	LANDING GEAR	MISC	TOTAL
1927	1								1
1929					1				1
1930		1							
1932							1		1
1934	1	1							2
1942							1		1
1944							1	1	2
1945	1								1
1946					2	1			3
1947	2				1	1			4
1948	1				1	1			3
1949									0
1950				1		1			2
1951	2				1	2		1	6
1952	3				3	1			7
1953	3	1			1				5
1954	2	1	2	1			1		7
1955	1				1	1			3
1956	1			1					2
1957	4		1	1	2		1		9
1958	4		1		1		1		7
1959		1			3	1	10		15
1960	3				5		8		16
1961	3		1		3	1	7		15
1962	1	1		1	4	2	6		15
1963	4		2		1		3	1	11
1964	7	1	2	2	10	9	52	6	89
1965		1	4	4	30	10	58	3	110
1966	2	1	1		20	12	43		79
1967	5	1	1	3	8	21	31	2	72
1968	4	1		5	11	11	16	2	50
1969	2			1	12	10	21		46
1970	5		1		19	5	30	2	62
1971	5	2	1	1	20	14	23	1	67
1972	3	1		1	20	12	20		57
1973	7	2			21	12	26	1	69
1974	3	3		2	23	13	25		69
1975	2			5	24	18	27		76
1976	3			1	26	18	24	2	74
1977	1	2	1	4	25	11	15	7	66
1978	3	4	1	2	24	18	19	2	73
1979	4	3	1	3	24	8	19	3	65
1980	5		1	6	26	10	26	1	75
1981	4	1		2	30	7	22	1	67

TABLE 4

INITIATION SITES - FIXED-WING

Bolt, Stud, or Screw (108 failures)
A59 A121 A127 A128 B2 B8 B13 D4 D36 E1 E6 E17 E20 E23
E24 E25 E41 E59 E66 E81 E88 E95 E104 E109 E153 E210 E212 E224
E221 E235 E252 E273 E285 E288 E293 E336 E357 E358 E361 F30 F49 F57
F61 F64 F66 F85 F110 F151 F167 F175 G28 G37 G56 G70 G71 G78
G87 G108 G119 G179 G187 G202 G217 G231 G235 G236 G242 G279 G285 G297
G290 G300 G307 G319 G321 G332 G338 G341 G355 G371 G374 G375 G378 G382
G390 G400 G420 G426 G435 G436 G440 G445 G447 G442 G460 G464 G480 G484
G494 G502 G506 G518 G530 G532 G536 H1 H8 H15

Fastener Hole or Other Hole (72 failures)
A24 A34 A51 A64 A81 A84 A86 A87 A88 A90 A93 A94 A111 A112
A114 A117 A122 A131 A134 B3 B9 B14 B23 C24 C25 E50 E251 E297
E319 E337 F124 G10 G12 G13 G15 G16 G17 G26 G27 G33 G45 G47
G67 G110 G146 G167 G181 G194 G207 G213 G215 G219 G222 G228 G243 G270
G276 G277 G291 G301 G304 G328 G330 G343 G364 G452 G462 G465 G500 G515
G537 G539

Fillet, Radius, or Sharp Notch (57 failures)
A4-A23 A26 A65 A136 B11 B31 C6 C7 C13 C15 E26 E92 E106
E144 E157 E263 E320 E369 E376 E388 E393 E404 F1 F13 F45 F96 F196
G39 G40 G42 G59 G193 G227 G360 G407 G493 G523 G531

Weld (53 failures)
A3 A25 A27 A79 A83 A107 C16 D15 D16 D17 D18 D32 D39 D46
E84 E230 E250 E274 E346 E384 G2 G32 G57 G65 G88 G101 G127 G140
G153 G166 G168 G172 G183 G196 G203 G218 G253 G303 G308 G318 G345 G363
G364 G366 G386 G391 G419 G421 G483 G514 G519 G522 H2

Corrosion (43 failures)
A98 A122 A128 A137 C9 C21 C23 D22 D39 E194 E197 E247 E330 E364
E368 E384 E388 F39 F62 F86 F97 F172 F183 F220 F225 G49 G326 G335
G349 G350 G379 G395 G430 G424 G454 G479 G487 G512 G517 G520 G525 G529
G540

Thread (other than bolt or stud) (32 failures)
A26 D34 E44 E85 E111 E117 E198 E355 E364 E383 E400 F14 F16 F24
F113 F127 F129 F143 F162 F171 F177 F214 F215 G5 G21 G69 G85 G94
G173 G189 G212 G463

Manufacturing Defect (27 failures)
A81 A95 A111 A131 A136 C18 E78 E170 E209 E291 E297 E304 E359 E372
E376 F25 F105 G38 G86 G185 G204 G314 G392 G394 G503 G533 H5

Scratch, Nick,or Dent (26 failures)
E370 F5 F17 F26 F38 F40 F55 F87 F89 F100 F119 F147 F148 F149
F154 F160 F169 F184 F188 F200 F202 F207 F216 F219 F224 F228

Fretting (13 failures)
A64 A98 E186 E203 F12 G30 G181 G326 G327 G362 G497 G500 H13

Surface or Subsurface Flaw (6 failures)
A65 A91 E367 E387 E391 H21

TABLE 4 (Cont'd)
INITIATION SITES - FIXED-WING

Improper Heat Treatment (4 failures)
E377 F60 G274 H1

Maintenance-Induced Crack (4 failures)
F144 F155 F223 H33

Work-Hardened Area (2 failures)
F133 H20

Wear (2 failures)
G14 G420

Crazing (1 failure)
C22

Belling of Pipe (1 failure)
H35

Rivet (1 failure)
D28

TABLE 5

LIST OF ACCIDENTS BY COUNTRY - FIXED-WING

PART I. CIVIL AIRCRAFT

ARGENTINA	A117
AUSTRALIA	A25 A33 A69 A76 A88 B34 B36 B37 D40 D46 E110 E111 E122 E141 E142 E181-184 E202 E249-252 E275 E300 E324 E325 E327 E338 E374 E375 F17 F86-88 F106 F118 F119 F130 F161 F181 F190 F216 F226 G7 G235 G243-245 G264-269 G296-302 G317-320 G337-346 G358 G363-366 G388-393 G415-420 G434 G439-442 G453-457 G472-475 G488 G491 G492 G518 G519 H17 H20 H23 H24 H30 H31
AUSTRIA	G333
BELGIAN CONGO	E7
BELGIUM	C21
BRAZIL	E59 F6 G44
CANADA	A56 A67 A73 A77 A110 A120 A122 A124 A136 B11 B33 C22 D29 D34 D41 E17 E18 E20 E22 E25 E28 E34 E40 E62 E78 E82 E83 E90 E95 E96 E104 E115 E118 E119 E131 E138 E213 E223 E229 E234 E236 E240 E243 E259 E264 E286 E291 E296 E297 E304-306 E313 E319 E331 E337 E339 E351 E357-359 E363 E364 E366 E368 E373 E388 E391 E393 E398 E405 E408 F12 F16 F40 F70 F92 F116 F128 F135 F148 F149 F154 F172 F183 F184 F213 F214 F217 F219 G12 G15 G17 G26 G27 G30 G33-35 G47 G105 G110 G146 G167 G168 G176 G181 G204 G207 G217 G227 G228 G270 G276 G323 G325 G399 G422 G423 G426 G428 G430 G445 G452 G462 G465 G468 G478 G480 G484 G494 G496 G497 G499 G500 G502 G503 G506 G510 G515 G522 G525 G527 G528 G530 G533 G538 G540 G542 H2 H8 H13 H28 H37
CHILE	A85 B24
COLUMBIA	B25 E89
DENMARK	D50
ETHIOPIA	A104
FINLAND	D5 E197 E217 E267 E335 F218 G371 G397 G408 G541 H3
FRANCE	D1 D48 E8 E74 E120
EAST GERMANY	A1
GREECE	G283
GUATEMALA	E13
INDIA	A80 E272 G413

TABLE 5 (Continued)
LIST OF ACCIDENTS BY COUNTRY

IRAN	G370
IRELAND	F10 G450
ISRAEL	G405
ITALY	C6 C7 E125 E177
JAMAICA	E159 E176 E241 F211 G200
JAPAN	B14 D36 E247 E312 E381 F127 F143 F160 F196 G410 G438 G483
LYBIA	A52 E178 G74
NEW GUINEA	A50 F227 G328
NEW ZEALAND	A51 A58 A62 A106 C23 E150 E174 E175 E179 E180 E276 F11 F96 F100 F108 F113 F120 F166 F193 F215 G306 G313 G332 G362 G376 G421 G523 G531 G536
NICARAGUA	E19 G280
NIGERIA	A47
NORTH YEMEN	E404
PAKISTAN	E27
PHILIPPINES	E225
POLAND	E353
PUERTO RICO	C17 F41 F153 G38 G95 G322
QATAR	G516
RWANDA	G529
SICILY	E9
SINGAPORE	D51
SPAIN	G292
SOUTH AFRICA	E369 H35
SUDAN	E203 G25
SWITZERLAND	E123
SYRIA	E4
TANGANYIKA	A42
TURKEY	F8

TABLE 5 (Continued)
LIST OF ACCIDENTS BY COUNTRY

UK A96 B1 B2 C20 D4 D19 D26 E1 E5 E15 E29 E30 E101 E102 E132 E198 F97 G6 G23 G351 G357 G406 G470 G497 G482 H1 H34

USA too many to list

VIRGIN ISLANDS E316 F179 G396

WEST GERMANY A2 A123 B32 D24 D30 D33 D35 D42 E218 E228 E238 E257 E258 E268 E271 E280 E284 E292 E293 E309 E314 E322 E336 E370 F57 F157 G353 G354 G360 G372 G385 G398 G400 G401 G409 G432 G437 G446 G451 G463 G535 H29 H36

ZAMBIA B28 G387

PART 2. MILITARY AIRCRAFT

ROYAL AUSTRALIAN AIR FORCE A43 E170 E209 E239 H15

ROYAL AUSTRALIAN NAVY B10 G448 H10

BELGIUM - AIR FORCE E382

CANADIAN FORCES A49 A97 B31 C18 D2 D3 D22 D44 E10 E56 E143 E230 E260

FRANCE - L'ARMEE DE L'AIR A64 A65

ROYAL SWEDISH AIR FORCE A113 A115 A116 E93 E127 E135 E136 E166 E185 E200 E232 E244 E246 E248 E294 E298 E310 E328 E341 E379 E397 H22 H25 H27

UK - ROYAL AIR FORCE A4-23 A118 A125 A130 B3 B8 B9 B13 B18 D23 D45 E370 G1

US AIR FORCE A35-41 A44 A45 A53-55 A60 A70 A71 A74 A84 A86 A90 A91 A93-95 A105 B4 B6 B7 B19-21 C1-5 C11-13 C15 D15-18 E354 E406 E407 F7 G2-5 G294 G295 G493

US AIR FORCE OR US NAVY E161-163

US ARMY E173

US NAVY A29-31 A46 E367

WEST GERMAN AIR FORCE A89

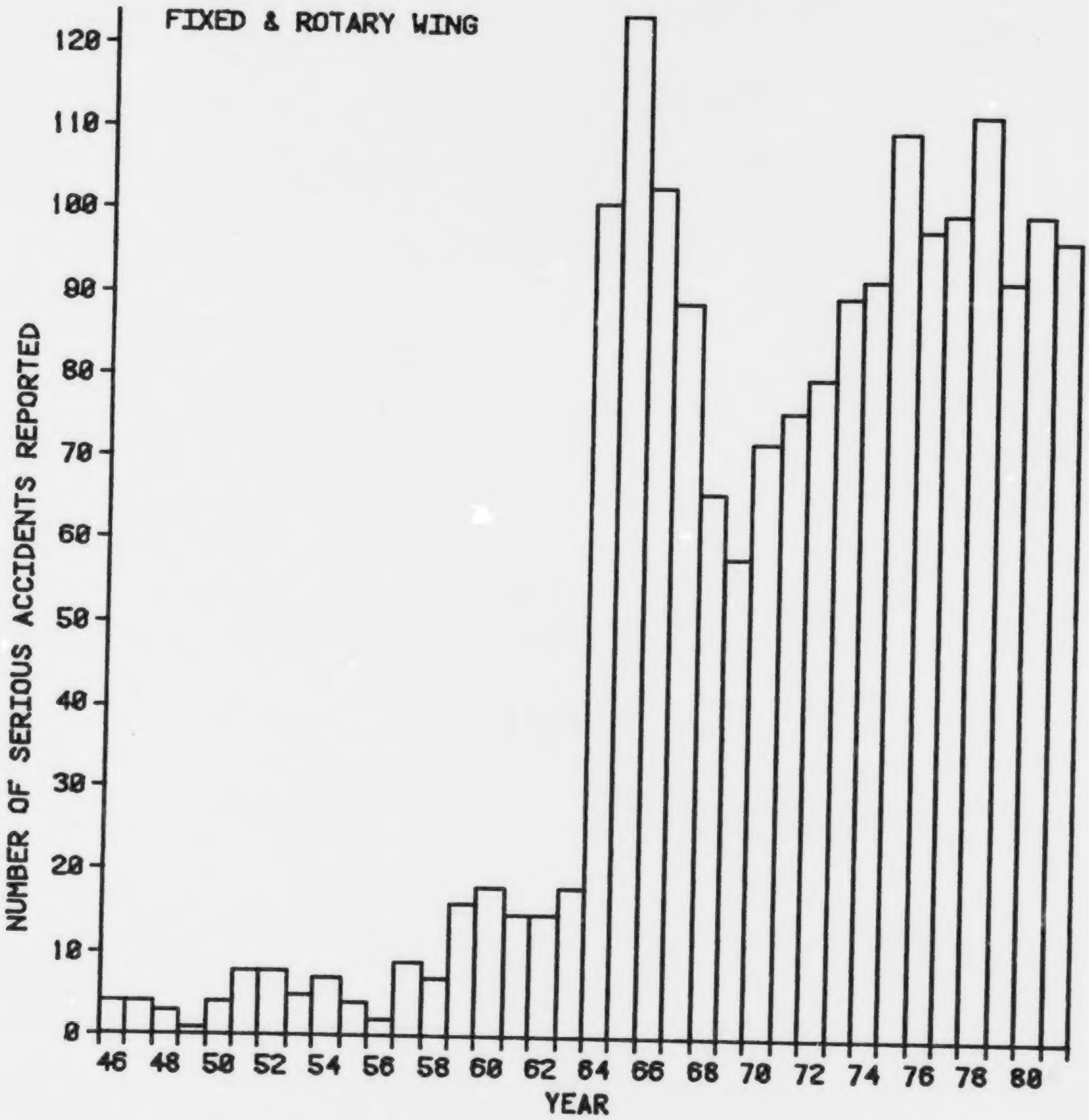

FIG. 1 NUMBER OF SERIOUS FATIGUE ACCIDENTS - FIXED-WING & ROTARY-WING

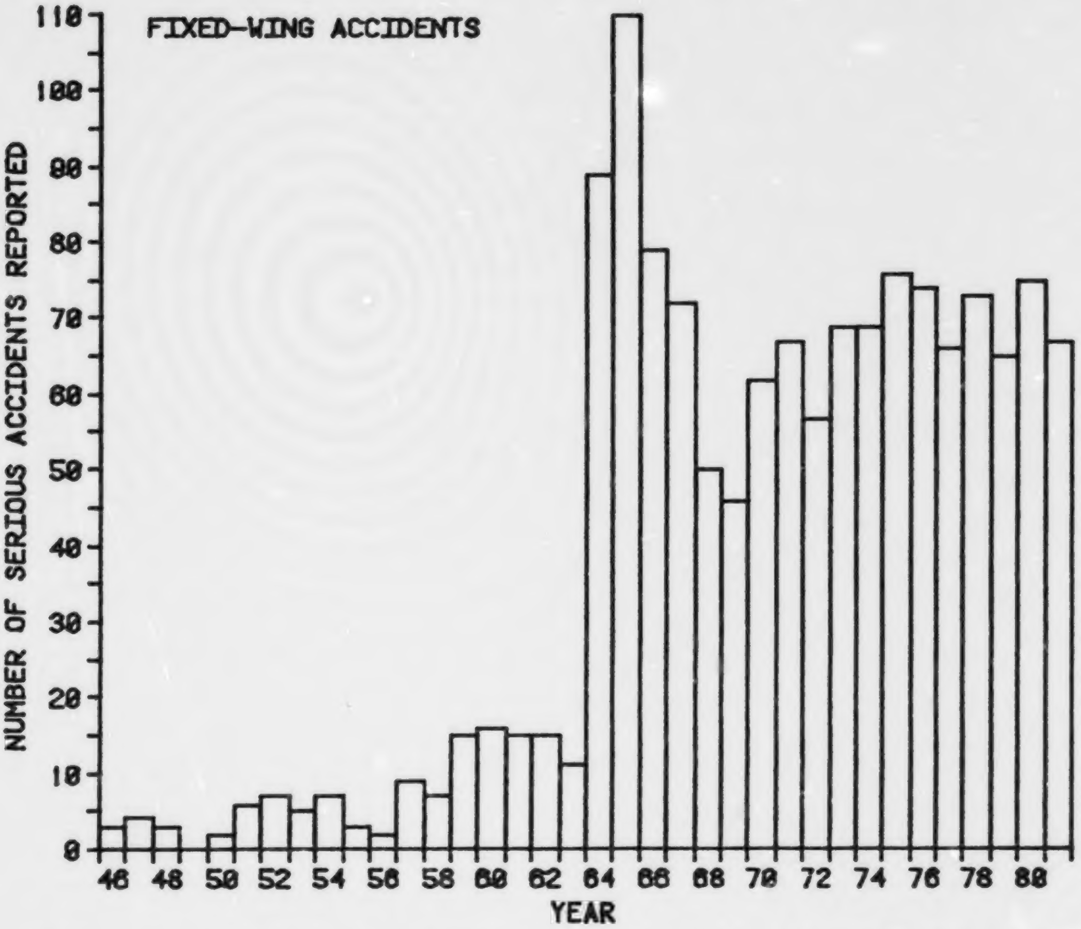

FIG. 2 NUMBER OF SERIOUS AIRCRAFT ACCIDENTS
- FIXED-WING

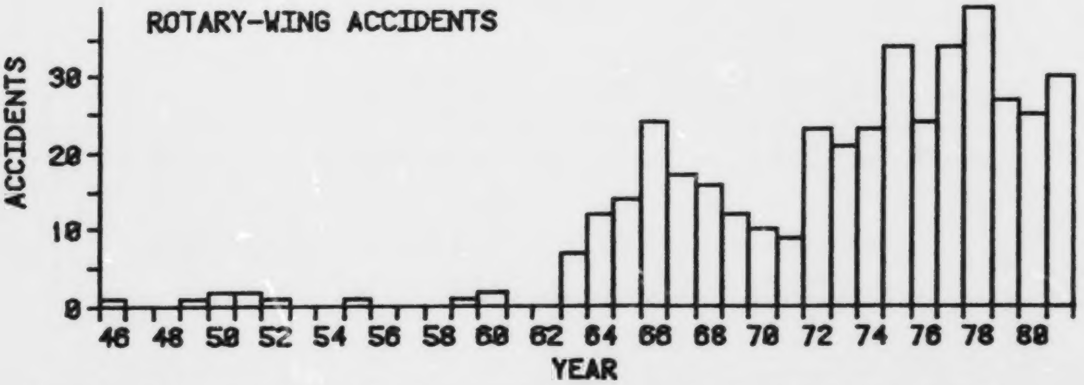

FIG. 3 NUMBER OF SERIOUS AIRCRAFT ACCIDENTS
- ROTARY-WING

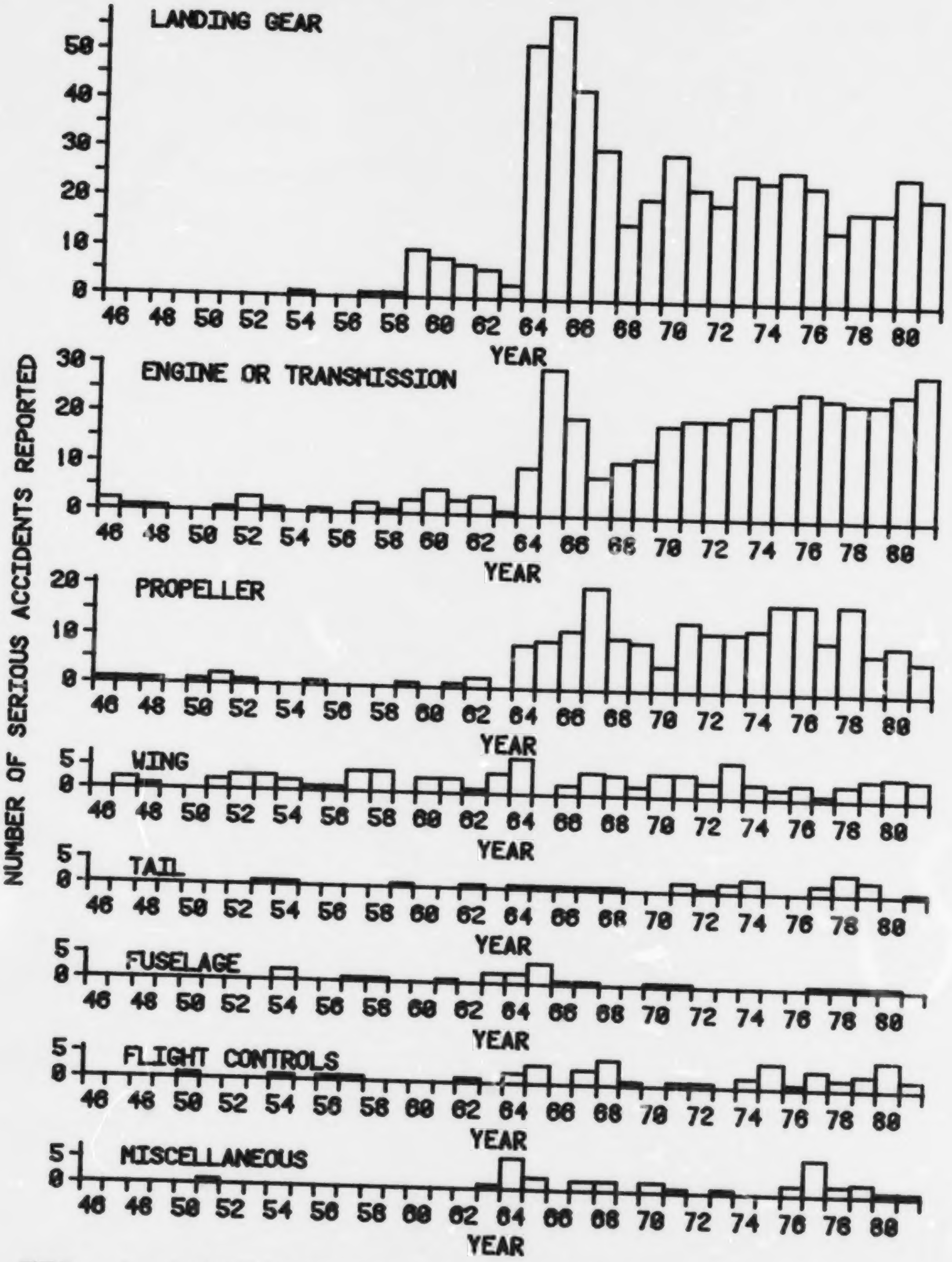

FIG. 4 CAUSES OF FATIGUE FAILURES - FIXED-WING AIRCRAFT

PART I
LISTING BY FAILURE TYPE

APPENDIX A
FIXED WING AIRCRAFT - WING

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
A1	Dornier Merkur (Luft Hansa)	23 Sep 27	6	D	Schleiz, Thuringen, Germany. Wing failure. Wing strut close to upper attachment point. Ref: Brenner, "DYNAMISCHE FESTIGKEIT VON FLUGZEUG-KONSTRUCTIONSTEILEN", DVL Jarbuch 1929, p 149; THE AEROPLANE, 28 Sept 27 p 440; Arnstein & Shaw, METALS & ALLOYS, July 1939, p 206 & 208; and Dornier GmBH files.
A2	Curtiss AT-32 Condor II (Swissair)	27 Jul 34	11	D	Tuttelingen, Germany. Port inter-wing strut failed, causing separation of engine and part of lower wing. Ref: J. Branger, p 9 in Proc. ICAF Symp., Melbourne, 1967; THE AEROPLANE, Aug 8 1934, p 180; L'AERONAUTIQUE, Sept. 1934 p 228.
A3	Type unknown	pre 1940	1?	D	USA? Welded wing strut failed, causing collapse of wing and fatal crash. Ref: "Prevention of the Failure of Metals under Repeated Stress", Batelle, John Wiley, 1941, p. 31.
A4 to A23	Vickers-Armstrongs Wellington (Royal Air Force)	May 42 to 1944	?	D	England. Wing failure. Lower spar boom at serration of boom joint outboard of nacelle (WS 41). 20 aircraft lost in a 2-year period. Most failures at WS 41. Airframe hours: 180-400. Ref: UK Ministry of Supply S&T Memo 10/54; Aeron. Research Council R&M No. 2300.
A24	Junkers Ju 52	WW II 1943?	?	D	S. America. Wing failure. Spar at a riveted construction in the tension chord. Ref: Gassner in FATIGUE IN AIRCRAFT STRUCTURES, A. Freudenthal (ed), 1956, p. 198.

A25	Stinson A2W	10 Jan 45	10	D	Spring Plains, Victoria, Australia. Left wing failure. Joint in welded steel tube between outer & centre sections of wing. Material: X4130 steel. 13,763 airframe hours. Ref: Hooke, ARL/STRUC-RPT-363 p 6.
A26	Piper Cub J-3	26 May 47	2	D	Ft. Lauderdale, Fla. USA. Wing failure at shoulder machined on threaded insert, inner end of left front, lower lift-strut fitting. Ref: AW May 24/48, p 36.
A27	Beech D18C (All American Aviation)	6 Dec 47	2	D	Wellsburg, W. Virginia, USA. Wing failure. Lower spar cap steel tube at toe of weld, right outboard wing panel. Ref: AMERICAN AVIATION, Dec. 15/47 p 28, & Jan 1/48, p 28; NTSB-AAR-72-33 p 3; & NBS CIRC 550, p. 28
A28	Martin 2-0-2 (Northwest)	29 Aug 48	37	D	Winona, Minn., USA. Outer panel, left wing separated. Lower front wing root fitting. Material: 75ST. Airframe hours: 1542. Ref: CAB AAI file 1-0117, SA-178, 20 Jun 49; WAAS p. 18/48.
A29	Attack-type airplane (US Navy)	approx 1950	?	?	USA? Wing failure. Role: dive bombing & rocket launching. Ref: Carl & Wegeng, INVESTIGATIONS CONCERNING THE FATIGUE OF AIRCRAFT STRUCTURES, Proc. ASTM 1954 p. 903.
A30	Attack-type airplane (US Navy)	approx 1950	?	?	USA? Wing failure. Role: dive bombing & rocket launching. Ref: Carl & Wegeng, INVESTIGATIONS CONCERNING THE FATIGUE OF AIRCRAFT STRUCTURES, Proc. ASTM 1954 p. 903.
A31	Piston-engine fighter (US Navy)	approx 1950-52	?	?	USA? Wing failure. Role: training in ground support tactics, rocket launching runs. Ref: Carl & Wegeng, INVESTIGATIONS CONCERNING THE FATIGUE OF AIRCRAFT STRUCTURES, Proc. ASTM 1954 p. 903.
A32	Vickers Viking	1951	0	S	Central Africa. Inspection found centre-section spar boom completely failed. Failure probably occurred with "bang" 3 months previously, but post-flight inspection could not locate failure at that time. Matl: DTD 464 (equiv 24ST). 6800 airframe hrs. Ref: J.K. Williams, p 108 in Gassner & Schutz, FATIGUE DESIGN PROCEDURES.
A33	D.H. 104 Dove	15 Oct 51	7	D	Kalgoorlie, Western Australia. Left wing failure. Crack in channel section, centre section spar. Matl: DTD 363 (equiv 75ST). 8977 airframe hours. Ref: Hooke, ARL/STRUC-RPT-363, p. 9

A34	Douglas DC-6	1952	0	S	?	Failure of front spar cap, and bottom skin and stringer panel between front & centre spar cap. Origin: bolt hole connecting engine attachment angle to front spar. Material: 75ST. 13,000 airframe hours. Aircraft landed safely. Ref: J.K. Williams, p 102 in Gassner & Schutz, FATIGUE DESIGN PROCEDURES, 1969.
A35	Convair B-36 (USAF)	1952 or 1953	?	?	?	Wing failure. Ref: J.D. Caldara, p 23 & x in WADC TR 59-507, 1959.
A36	Northrup F-89C Scorpion (USAF)	1952	?	D	?	Wing failure, wing-fuselage fitting. Ref: AW Dec. 1/52, p 16, & Oct. 20/52, p 52
A37	Northrup F-89 Scorpion (USAF)	Sep 52	2	D	Detroit, USA.	Right wing failure, wing-fuselage fitting. Ref: AW Dec. 1/52, p 16 & Sept. 15/52, p 17
A38	Republic F-84 Thunderstreak (USAF)	1953	?	?	?	Wing failure. Ref: J.D. Caldara, p 20 & x in WADC TR 59-507, 1959.
A39	Boeing B-52 Stratofortress (USAF)	1953-59	?	?	?	Wing failure. Ref: J.D. Caldara, p 25 in WADC TR 59-507, 1959.
A40	Boeing B-52 Stratofortress (USAF)	1953-59	?	?	?	Wing failure. Ref: J.D. Caldara, p 25 in WADC TR 59-507, 1959.
A41	N. American F-51 Mustang (USAF)	1953-59	?	?	?	Wing failure. Ref: J.D. Caldara, p 29 in WADC TR 59-507, 1959.
A42	Vickers Viking (CAA)	29 Mar 53	13	D	Mtara, Tanganyika.	Wing failure. Single-spar mainplane joint, lower spar boom, WS 141. Material: DTD 363 (equiv to 75ST). Airframe hours: 8800. Ref: J.K. Williams, 4th ICAF Proc., Munich, 1965, p. 103; WAAS, p. 7/53.
A43	Bristol 170 Freighter (RAAF)	25 Nov 53	2	D	Mallala, South Australia.	Wing failure in high-load high-speed manoeuvre. Fatigue crack reduced strength below design strength, but not necessarily below limit strength. Lower surface of torsion box on joint between rear lower skin angle and inter-span skin. Ref: Hooke, ARL Report SM224.
A44	North American F-86F Sabre (USAF)	Nov 54	?	D	Nellis Air Force Base, Nevada USA.	Wing failure at under-wing aluminum attach bars. Ref: AW Nov 15/54 p 7, & Nov. 29/54, p 16

A45	North American F-86H Sabre (USAF)	Nov 54	?	D	Nellis Air Force Base, Nevada USA. Wing failure at under-wing aluminum attach bars. Ref: AW Nov 15/54 p 7, & Nov. 29/54, p 16
A46	N. American FJ-4 Fury (US Navy)	1955-59	1	D	? Wing failure (bolt holes). Role changed from fighter to fighter-bomber. Ref: Keen, p 121 in WADC TR 59-507, 1959.
A47	Bristol 170 Wayfarer (West African Airways)	5 Feb 55	13	D	Lagos, Nigeria. Left wing failure, doubler plate of spar. Ref: WAAS p. 3/55
A48	Cessna 140	1956	?	D	USA. Wing failure. Lift strut fitting. Ref: Australian DoT.
A49	Lockheed/ Canadair T-33 Silver Star (Canadian Forces)	29 May 57	1	D	Zweibrucken, Germany. Port wing failed from crack in spar cap (lower front) near attachment fitting. Ref: CF ACAIRS.
A50	Scottish Aviation Twin Pioneer (Kroonduif)	30 Aug 57	3	D	Off Jahen Island, New Guinea. Separation of right wing. Failure of V-brace strut. Ref: WAAS p. 15/57
A51	Bristol 170 Freighter (Straits Air Express)	21 Nov 57	4	D	Christchurch, New Zealand. Wing failure. Lower boom of starboard outer wing, front spar joint at last bolt hole. Material: DTD 364 (equiv. 24ST). Airframe hours: 7900. Ref: Williams, 4th ICAF Proc., 1965, p. 105; ICAO AAD 10, 1961
A52	Scottish Aviation Twin Pioneer	7 Dec 57	6	D	Fezzan, Libya. Failure in forward tube of V-brace strut, port wing. Outer wing panel separated. Material: 4T2 steel. Airframe hours: 564. Ref: ICAO AAD No. 9, 1959, p.241
A53	Boeing B-47 Stratojet (USAF)	1958	3?	D	USA. Wing separation. Longeron failure. Role: Low Altitude Bombing System. Ref: AW May 11/59, p 33 & Dec. 15/58, pp 71-75.
A54	Boeing B-47 Stratojet (USAF)	1958	3?	D	USA. Wing separation. Longeron failure. Role: Low Altitude Bombing System. Ref: AW May 11/59, p 33 & Dec. 15/58, pp 71-75.
A55	Boeing B-47 Stratojet (USAF)	1958	3?	D	USA. Wing separation. Longeron failure. Role: Low Altitude Bombing System. Ref: AW May 11/59, p 33 & Dec. 15/58, pp 71-75.

A56	Noorduyn Norseman V	15 Sep 58	1	D	Nanika, Ont. Canada. Wing failure. Rear front eyebolt, attaching diagonal wing strut to front spar of right wing. Ref: MoT Canada file 5008-B19-10
A57	Cessna 195	1960	1?	D	USA. Wing failure, wing carry-through. Ref: Australian DoT.
A58	Cessna 180	1 Mar 60	1	D	Mendip Hills, New Zealand. Wing failure. Starboard rear spar (root end). Crack probably initiated in ground-loop 3 months previously. Role: agricultural fertilizing. Airframe hours: 1813. Ref: NZ AIB Report 25/3/1060.
A59	Curtiss C-46F (Capitol Airlines)	15 Oct 60	2	D	Plain City, Utah USA. Right wing separated. Lower attach angle bolts holding forward portion of outer wing to centre section. Ref: WAAS p 24/60
A60	Boeing B-52 (USAF)	1961?	?	D	USA? Wing failure. Ref: McCarthy, AEROSPACE HISTORIAN, March 1982, p. 52.
A61	Beech 35 Bonanza	25 Mar 61	1?	D	Brookfield, Mass. USA. Wing failure. Centre-section steel truss. Ref: CAB Structures Report dated 14 June/63 on May 13/63 accident.
A62	Aero Commander 680S	21 Nov 61	6	D	Mount Ruapehu, New Zealand. Separation of right wing. Lower spar cap, front spar at WS 24. Upper & lower rear spar caps had failed sometime previously from single load of unknown origin. Airframe hours: 5040. Ref: NZ AIB Report Report 25/3/1192.
A63	Beech 35 Bonanza	30 Sep 62	1?	D	Parsons, Kansas USA. Wing failure. Centre-section steel truss. Ref: CAB Structures Report dated 14 June/63 on May 13/63 accident.
A64	Military bomber (French)	approx 1963	?	D	France? Wing failure. Lower boom, forward spar, 2014 forging. Origin: fretting at bolt hole edge. Ref: Barrois, AGARD-AG-176, pp 334-5.
A65	Old military aircraft (French)	approx 1963	?	D	France? Wing failure. Lower boom, forward spar, 2014 forging. Origin: flaw at external sharp angle. Ref: Barrois, AGARD-AG-176, pp 334-5
A66	Cessna 195	1963	1?	D	USA. Wing failure, wing carry-through. Ref: Australian DoT.

A67	Noorduyn Norseman V seaplane	22 Jan 63	1	D	Pickle Lake, Ont. Canada. Left wing failure. Upper forward strut eyebolt. Ref: ICAO AAD no. 15 Vol. II, 1967, p 134.
A68	Beech 35 Bonanza	13 May 63	1?	D	Perry, Oklahoma USA. Failure of left wing. Forward centre-section steel truss at wing-fuselage attachment. Material: steel. Airframe hours: 4132. Ref: CAB Structures Report dated 14 June/63.
A69	de Havilland DHC-2 Beaver	10 Sep 63	1	D	Armidale, Australia. Wing failure (strut attachment fitting). Ref: Australia DoT
A70	Douglas B-26 Invader (USAF)	7 Jan 64	2	D	Vietnam. Wing failure, main spar. Role: counter-insurgency. Ref: LIFE magazine, 8 May 64 p 34D & 29 May 64 p 23; Francillon, MCDONNEL DOUGLAS AIRCRAFT SINCE 1920, p. 359; Wagner, AMERICAN COMBAT PLANES, 3rd edition, p.189.
A71	Douglas B-26 Invader (USAF)	9-15 Feb 64	2	D	Vietnam. Wing failure, main spar. Role: counter-insurgency. Ref: LIFE magazine, 8 May 64 p 39; Francillon, MCDONNEL DOUGLAS AIRCRAFT SINCE 1920, p. 359; Anderton, THE HISTORY OF THE U.S. AIR FORCE.
A72	Mooney M-18C	31 Mar 64	1	D	Roanoke Rapids, N.C. USA. Wing failure (spar). Ref: NTSB file 2-1036
A73	Aero Commander 680E	1 Apr 64	4	D	Thompson, Man. Canada. Separation of right wing. Front spar lower cap, WS 24. Airframe hours: 5949. Role: low-level surveys. Ref: MoT file C-30139; ICAO AAD No. 16, vol. I, 1968, p. 138.
A74	Douglas B-26 Invader (USAF)	Apr 64	2	D	Elgin Air Force Base, Fla. USA. Left wing separated. Failure of lower spar cap. Role: Ground-attack strafing. Ref: AWST Apr. 13/64, p 30, & May 4/64, p 13.
A75	Beech G18S	16 Jul 64	4	D	Toadlena, New Mexico, USA. Wing failure, WS 81. Ref: NTSB file 2-0912
A76	de Havilland DHC-2 Beaver	Jul 64	1	D	Australia. Wing failure (strut attachment fitting). Ref: Australia DoT
A77	Piper PA-18 Super Cub	11 Jun 66	1	D	Moose Jaw, Sask. Canada. Right wing failure (rear strut fork end). Problem brought about by repeated heavy loadings imposed by crop spraying and rough field operations. Ref: MoT Canada File 2969

A78	Beech C18S	15 Aug 66	4	D	Anchorage, Alaska USA. Right wing failed. Fracture adjacent to landing gear slide cluster. Ref: NTSB file 2-1183
A79	Beech C-45H	28 Feb 67	2	D	Middletown, Del. USA. Left wing failure. Lower cap of spar at weld approx 8 inches outboard of outer panel attach point. Ref: NTSB file 2-0164
A80	HAL Pushpak	Sep 67	1?	D	Jaipur, India. Wing failure. Lift strut lower-rear attach lug. Ref: Australian DoT.
A81	Aero Commander 560E	27 Sep 67	7	D	Dallas, Texas USA. Left wing failure (spar). Two overlapping rivet holes found in aft leg of spar cap. Ref: NTSB file 2-1000
A82	Beech E18S	28 Apr 67	1	D	Acworth, Georgia USA. Wing failure at WS 81, lower left spar (elliptical steel tube). NTSB file 2-0854
A83	Piper PA-25 Pawnee	11 Aug 67	1	D	Coweta, Okla. USA. Right wing failure. Spar lugs, wing attach fitting, improper weld. Role: aerial application. Ref: NTSB file 2-1044
A84	N. American F-100 Super Sabre (USAF)	1967 or 68	1?	D	Nellis AFB, USA. Wing failure at Wing Canted Station 102, lower skin 51% spar bolt holes. Matl: 7075-T651. 2140 airframe hours. Ref: Fitch, AFFDL TR 70-144, pp 742, 746 & 749; AGARD CP-118 p. 5-10
A85	Douglas DC-3	8 Apr 68	36	D	Coyhaique, Chile. Starboard wing failure. Ref: Finch, p 2.4/49 in PROCEEDINGS 10TH ICAF SYMPOSIUM, Brussels 1979; & WAAS.
A86	N. American F-100D Super Sabre (USAF)	21 Oct 68	0	D	Laughlin AFB, Del Rio, Texas USA. Wing failure at Wing Centre Section, lower-cover outer-skin bolt hole. Matl: 7075-T6. 2890 airframe hr. Role: Thunderbirds demo team. Ref: Fitch, AFFDL TR 70-144, pp 742, 746, 749
A87	Fairchild Hiller F27-B (Wien Consolidated)	2 Dec 68	39	D	Pedro Bay, Alaska, USA. Separation of right wing, WS 197. Cracks at fastener holes in wing skin at tank access door. Ref: NTSB file 1-0038; NTSB AAR-70-16
A88	Vickers Viscount 720C (MacRoberson-Miller Airlines)	31 Dec 68	26	D	Port Hedland, Western Australia. Separation of starboard wing. Main spar lower boom, WS 143. Fatigue endurance reduced by insertion of flared bushings. Ref: ICAO AAD No. 19 1973, p. 71.

A89	Lockheed F-104G (German AF)	pre-Dec/69	1	D	Luke AFB, USA. Separation of right wing. Lower skin access cutout, WS 80.7. Ref: AGARD CP-141, p. 5-11 & AFFDL TR 72-80, p. 3-29.
A90	McDonnell F-4 Phantom II (USAF)	16 Dec 69	0	S	USA? Failure of left outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 1700 airframe hours. Ref: AGARD CP-118 p. 5-5 & 5-14.
A91	General Dynamics F-111 (USAF)	22 Dec 69	2	D	Nellis AFB, Nevada USA. Left wing separated. Lower attachment plate of wing pivot assembly contained an initial flaw (D6ac steel). Airframe hours: 105. Ref: "F-111 GENERAL DYNAMICS" by Gunston, 1978; AGARD CP-221, p. 3-2.
A92	DH 104 Dove (TAG Airline)	28 Jan 70	9	D	Cleveland, Ohio, USA. Wing separation. Lower right wing/fuselage root joint attach fitting. Material: steel. Airframe hours: 9384. Ref: NTSB file 3-1541
A93	McDonnell F-4 Phantom II (USAF)	26 Feb 70	0	S	USA? Failure of left outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 1259 airframe hours. Ref: AGARD CP-118 p. 5-5 & 5-14.
A94	McDonnell F-4 Phantom II (USAF)	18 Mar 70	0	S	USA? Failure of right outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 464 airframe hours. Ref: AGARD CP-118 p 5-5 & 5-14.
A95	Northrup F-5A (USAF)	20 Apr 70	1	D	Williams AFB, USA. Wing separation, centre wing lower skin. Tool damage caused initial crack. Ref: NASA SP-309, p. 235; US Army AMMRC MS 77-5, p 1.5.6
A96	Morovan Zlin Z526A	3 Jun 70	0	D	UK. Failure of centre-section, lower spar boom, left wing inboard of undercarriage leg. Aircraft crash landed successfully. A/F hours: 453, mainly aerobatics. Ref: UK CAA Rept 15/71
A97	Lockheed CF-104 Starfighter (Canadian Forces)	25 Mar 71	0	D	Cold Lake, Alta. Canada. Wing failure (lower skin). Skin had wrong grain direction. Ref: Canadian Forces.
A98	DH 104-7 AXC Dove (Apache Airlines)	6 May 71	12	D	Coolidge, Ariz. USA. Right wing failure. Lower main root joint fitting. Fatigue propagated in area of corrosion & fretting. Ref: ICAO AAD No. 20, 1974, p 113; NTSB AAR-72-19

A99	Bowers Fly Baby 1-A	20 May 71	0	D	Oxford, Conn. USA. Left wing failure. Flying-wire turnbuckle failed. Pilot parachuted. NTSB file 3-1309
A100	Helio H-295 Super Courier	21 Aug 71	3	D	Sitka, Alaska, USA. Separation of left wing, lower attachment fitting. Ref: NTSB file 3-2106
A101	Piper J-4A	4 Dec 71	0	D	Boise, Idaho USA. Failure of left wing. Lift strut, fuselage attach clevis broke. Previous landing incident. Ref: NTSB file 3-4040.
A102	Beech E18S (Aero Taxi)	22 Jun 72	1	D	Cleveland, Ohio, USA. Left wing separated. Lower spar cap, WS 81. Crack missed during prior inspection. Airframe hours: 8227. Ref: NTSB-AAR-72-33
A103	Piper PA-22	19 Jul 72	0	S	Eden Prairie, Minn. USA. Right wing lift strut fork. Precautionary landing made. NTSB file 3-2600.
A104	Douglas DC-3	10 Sep 72	11	D	Dabark, Ethiopia. Right wing separated. Wing-to-centre section attachment. Ref: ICAO ADREP 361/72
A105	McDonnell F-4 Phantom II (USAF)	Jan 73	?	D	Nellis AFB, USA Port wing failure, lower lock lug. Ref: US Army AMMRC MS 22-5, p. 1.5.9.
A106	Douglas DC-3 (Southern Air Super)	23 Feb 73	1	D	Seddon, New Zealand. Separation of right wing. Lower centre wing wrap-around & internal doublers, inboard of WS 142. Role: fertilizing. Airframe Hours: 24,261 including 1503 in agricultural role. Ref: NZ AAR 73-032.
A107	Beech E18S (Air Iowa)	19 Apr 73	6	D	Davenport, Iowa. USA. Separation of right wing. Lower spar cap, WS 81, at weld in spar. Crack missed in previous inspections. NTSB Rept AAR-73-18
A108	Piper PA-25 Pawnee	24 Aug 73	0	D	Rayville, La. USA. Wing separation. Fracture of spar. Role: aerial application. NTSB file 3-3681
A109	Piper PA-25 Pawnee	1 Oct 73	0	D	Rohwer, Ark. USA. Right wing separated. Rear mount bracket and front spar broken at mount bracket. Role: aerial application. NTSB file 3-2775
A110	Beech D18S on floats	16 Oct 73	1	D	Thompson, Man. Canada. Separation of wing. Left wing lower spar cap. Crack undetected in prior x-ray. Ref: MoT Canada file C30139.

A111	Piper PA-25 Pawnee	18 Oct 73	1	D	Slaton, Texas, USA. Wing failure (spar). Initiation at improperly drilled rivet hole. Role: aerial application. Ref: NTSB file 3-4148
A112	Lockheed 382E Hercules (Saturn Airways)	23 May 74	4	D	Springfield, Ill. USA. Separation of port wing. Outer WS 162, lower front spar cap (1st fastener hole). Material: 7075-T6511. Airframe hours: 18,837. Ref: NTSB-AAR-75-5
A113	Saab-Scania AJ37 Viggen (Swedish AF)	11 Jul 74	0	D	Just south of Lake Vanern, Sweden. Port wing failure. Main spar, close to root. Ref: Saab-Scania FKHU-81.27.
A114	Lockheed 382B Hercules	30 Oct 74	4	D	Bettles, Alaska, USA. Separation of right wing. Fastener holes in lower hat section, skin panels, No. 3 engine compressor diffuser case, centre WS 183. Ref: NTSB file 3-0519
A115	Saab-Scania AJ37 Viggen (Swedish AF)	6 Oct 75	0	D	Lake Vanern, Sweden. Port wing failure. Main spar, close to root. Ref: Saab-Scania FKHU-81.27.
A116	Saab-Scania AJ37 Viggen (Swedish AF)	10 Oct 75	0	D	Baltic Sea near Sweden. Right wing failure. Main spar, close to root. Ref: Saab-Scania FKHU-81.27.
A117	Hawker Siddley HS 748 (YPF State Enterprise)	14 Apr 76	34	D	Cutral-Co, Argentina. Separation of right wing. Crack origin at rivet holes of reinforcing plate by external rib of engine. Material: BS L72. Airframe hours: 25,760. Ref: ICAO ADREP 131/76
A118	McDonnell Douglas F-4M Phantom II (Royal AF)	23 Jul 76	0	D	Coningsby, UK. Wing failure. Outer wing fold lug, aft lock lug. Loads caused by buffeting. Ref: RAF.
A119	Boeing B-17G	17 Aug 76	0	S	Cordele, Ga. USA. Left front spar, lower cap centre section, P/N 753424-2 cracked. 1/2" outboard of inboard bolt of aft terminal plate, 8" inboard of inboard jack pad. Airframe hours: 5546. Role: spraying. Aircraft landed safely. Ref: NTSB file 3-3899.
A120	FFA Diamant 16.5 sailplane	17 Apr 77	1	D	Omemee, Ont., Canada Separation of right wing. Crack in root web. Areas of root web had a lack of bonding. Material: fiberglass. Airframe hours: 784. Ref: MoT Canada file 070033.

A121	Piper PA-22	18 Feb 78	2	D	Camden, Tenn. USA Right wing failed (strut attach bolt). Unapproved mod: probe attached to wing strut. Ref: NTSB file 3-0444
A122	Helio H-295 Super Courier	15 Aug 78	4	D	Amai Inlet, BC, Canada. Wing separation. Lower left carry-through fitting in bottom portion of lug at wing attachment bolt hole. Origin: corrosion pitting in bolt hole bore. Airframe hours: 1178. Aircraft damaged in prior accident. Ref: MoT Canada file P80084.
A123	Let L-13 Blanik sailplane	19 Nov 78	0	D	Kamp-Lintfort, W. Germany. Spar failure, left wing, during looping. Fatigue probably because of earlier overstress. Occupants parachuted. Ref: West German file 3X0479.
A124	Beech A90 King Air (Transport Canada)	1 May 79	2	D	Sherrington, Que. Canada. Right wing separated. Bathtub fitting joining centre section to outer wing. Role: low-level navaid calibration. Airframe hours: 5466. Matl: 2014-T6. Ref: MoT Canada file 79-H90002
A125	British Aerospace Buccaneer (Royal AF)	12 Jul 79	2	D	Osnabruck, W. Germany. Wing separated. Main spar latch pin, wing-fold joint. Ref: RAF & FI 22 Dec/79, p. 2048.
A126	Piper J-3C	27 Aug 79	0	D	Aurburndale, Florida USA. Right wing failed. Rear inboard strut clevis. Ref: NTSB file 3-3800
A127	Bayles Special 1	13 Oct 79	2	D	Jackson, Tenn. USA.. Separation of wing. Bolt holding rear strut to fuselage failed. Ref: NTSB file 3-3433.
A128	Beech 200 Super King Air	22 Jan 80	0	S	Zanesville, Oh. USA. Fatigue fracture of lower forward wing attach bolt. Stress corrosion where CD plate scored. Ref: NTSB file 3-1137.
A129	Piper PA-22	2 Feb 80	2	D	Princeton, Ill. USA. Wing failure, right front lift-strut fork end. Ref: NTSB file 3-0415
A130	British Aerospace Buccaneer S.2B (Royal AF)	7 Feb 80	2	D	Nellis AFB, Nevada, USA. Right wing failure. Mainplane inner-front spar. Ref: FI 9 Aug. 80, p. 510 & 16 Aug. 80, p. 587.

A131	Piper PA-25 Pawnee	2 Aug 80	1	D	Dumas, Texas USA. Left wing failed (spar) where lower flange was mis-drilled. Role: crop spraying. Ref: NTSB file 3-3345.
A132	Piper PA-20 Pacer	26 Nov 80	3	D	East Berlin, Pa. USA. Right wing failure. Strut lower fork assembly. Ref: NTSB file 3-3206.
A133	Piper PA-24 Commanche	1981 or 82	?	?	? Failure of wing lower spar cap. Ref: Canadian General Aviation News, Dec/82 p 31; & US Airworthiness Directive AD 81-19-01.
A134	Douglas B-26 (Calspan variable-stability aircraft)	3 Mar 81	3	D	Near Edwards AFB, Cal. USA. Left wing failure. Front lower forward spar cap at WS 140 (most outboard bolt hole attaching spar to nacelle fittings). 9467 airframe hours. Ref: NTSB file 3-3360.
A135	Hall Cherokee II (sailplane)	2 May 81	1	D	Valyermo, Ca. USA. Glider pitched up, breaking tow rope. Wings separated. Pre-existing cracks in wood spars. Ref: NTSB file 3-2441.
A136	de Havilland DHC-2 Beaver	1 Aug 81	1	S	Big Hook Lake, Ont. Canada. Left wing separated (upper fitting of strut assembly). Strut had improperly-formed fillet radius and was not removed from service as per AD. 7228 airframe hr. Ref: DoT Canada file 81-C10088.
A137	Beech E90 King Air	26 Oct 81	1	D	Mineral Wells, Texas USA. Left wing separated. Lower-wing forward attachment bolt failed from fatigue corrosion. Ref: AWST Nov. 9/81, p. 26.

Total Fatalities: 400

APPENDIX B
FIXED-WING AIRCRAFT - TAIL

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
B1	Junkers F.13 (Walcot Airlines)	21 Jul 30	6	D	Meopham, Kent UK. Breakage of tailplane from severe buffeting from air eddies produced by the wing. Ref: THE AEROPLANE 28 Jan/31 pp 138-142; Nissen, AIRCRAFT ENGINEERING, Oct/40 p 293; Teed, p 264 in J.A. Pope, METAL FATIGUE, 1959.
B2	Handley Page W.10	22 Sep 34	4	D	Aston Clinton, England. Fracture of main bolt securing the bracing wire to front spar of the tailplane, allowing tailplane to twist. Airframe hours: 5000. Ref: THE AEROPLANE, 7 Nov. 34, p 545.
B3	Hawker Typhoon (RAF)	WW II	1	D	UK? Tail failure. Origin: rivet hole. Possibly several additional accidents. Ref: Teed, pp 264-265 in J.A. Pope, METAL FATIGUE, 1959; Owen, UK ARC R&M 2688.
B4	Curtiss SB2C Helldiver (USAF)	WWII	?	D	? Lost horizontal tail. Cracks found in tails of other SB2C and Brewster SB2A aircraft. Attributed to structural response to unsteady airloads. Ref: L. Douglas, AHS Spec. Meeting on Helicopter Fatigue Methodology, 1980, p.4
B5	Type unknown (probably US military)	pre-1945	?	D	USA? Vertical tail separated. Crack in stabilizer rear spar attachment to fuselage, starting at free edge of 0.051 Al alloy. Failures after 2000 flight hours. Ref: Davis, "Fatigue Failure of Aircraft Parts", AUTOMOTIVE & AVIATION INDUSTRIES, May 1/45, p. 72.
B6	N. American F-51 Mustang (USAF)	1953-59	?	?	? Tail failure. Ref: J.D. Caldara, p 29 in WADC TR 59-507, 1959.
B7	Convair B-36 (USAF)	1953-59	?	?	? Tail failure. Ref: J.D. Caldara, p 23 in WADC TR 59-507, 1959.
B8	Handley Page Hastings C.1 (RAF)	Jan 53	?	?	Fayid, Egypt. Elevator outer hinge-bolts. Ref: Barnes, HANDLEY PAGE AIRCRAFT SINCE 1909, p 457.

TAIL FAILURE (FIXED-WING)

B9	Handley Page H.P.80 Victor prototype	14 Jul 54	4	D	Cranfield, UK. Tailplane separated. Cracks around bolt holes in fin allowed 3 bolts securing tailplane to loosen and shear. Ref: Barnes, HANDLEY PAGE AIRCRAFT SINCE 1907, p. 506.
B10	Fairey Gannet (RAN)	30 Jan 59	1	D	Sydney, Australia. Tail plane assembly detached. Ref: Royal Australian Navy.
B11	Cessna 150	4 Nov 62	0	D	Prince Albert, Sask. Canada. Bottom flange of rudder spar. Origin: bend radius of flange. Role: aerobatics. Ref: MoT Canada file 1827
B12	CallAir A-5T	24 Aug 64	0	S	Bainbridge, Ga. USA. Left stabilizer attach tube. NTSB file 3-2615.
B13	Handley Page Hastings (Royal Air Force)	6 Jul 65	41	D	Dorchester, England. Upper two attachment bolts of the starboard elevator outrigger. Ref: FI 5 Aug. 65, p. 240.
B14	Boeing 707-436 (BOAC)	5 Mar 66	124	D	Mt. Fuji, Japan. Vertical stabilizer separated. Gust load considerably in excess of design limit. Fatigue cracks in vertical stabilizer rear spar, starboard attachment fitting (bolt holes). 19,532 hours. Test on similar fitting with cracks failed at 110% limit design load. Ref: UK Board of Trade CAP 286, 1967.
B15	Glendening Stits	24 Dec 67	1	D	Corona, Calif. USA. Left horizontal-stabilizer attach fitting. Ref: NTSB file 2-1030
B16	Cessna 150	12 Dec 68	0	S	North Iliamna, Alas. USA. Rudder at vertical spar. NTSB file 3-4306.
B17	Cessna U206B	19 Sep 71	1	D	Anchorage, Alaska, USA. Vertical fin & rudder separated, cracks at attach points. Ref: NTSB file 3-2304
B18	Folland Gnat T Mk 1 (Royal AF)	13 Dec 71	2	D	Upper Heyford, UK. Fin separated (attachment lugs). Role: aerobatic demonstration team. Ref: RAF.
B19	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. 500 airframe hours. Aircraft recovered safely. Ref: Miller & Lowndes in AGARD CP 118, p. 5-5.

B20	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. Aircraft recovered safely. Ref: Miller & Lowndes in AGARD CP 118, p 5-5.
B21	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. 1540 airframe hours. Aircraft recovered safely. Ref: Miller & Lowndes in AGARD CP 118, p. 5-5.
B22	Pitts S-2A Special	3 Aug 72	0	S	Miami, Fla. USA. Forward attach tube of right horizontal stabilizer. Role: aerobatics. NTSB file 3-1132
B23	Stitts SA-3A Playboy	10 Jun 73	1	D	Macomb, Illinois USA. Horizontal stabilizer failed. Lead edge mount tube broken at attach hole. NTSB file 3-4148
B24	Curtiss C-46A	17 Dec 73	3	D	Coyhaique, Chile. Elevator separated (elevator hinge pins?). Ref: Finch, p 2.4/49 in PROCEEDINGS 10TH ICAF SYMPOSIUM, Brussels 1979; & WAAS.
B25	Vickers Viscount 785 (Taxi Aero Opita)	8 Jun 74	44	D	Cerro El Retiro, Colombia. Separation of left tailplane (spar). Ref: ICAO AAD No. 20, 1977, p. 134.
B26	Fokker DR-1	14 Jul 74	0	S	Tehachapi, Cal. USA. Rudder post failed above upper hinge. Rudder folded to horizontal position. NTSB file 3-1871
B27	Cessna A188B	25 Jul 74	0	S	Fairfax, S.C. USA. Right horizontal stabilizer rear spar and channel assembly. NTSB file 3-4350.
B28	Boeing 707 321C (Dan-Air)	14 May 77	6	D	Lusaka, Zambia. Separation of right horizontal stabilizer & elevator. Stabilizer rear top chord. Airframe hours: 47,621. Ref: UK Aircraft Accid. Rept. 9/78, 8 Feb. 79.
B29	Piper PA-23 Aztec	27 Sep 77	0	S	Morris, Ill. USA. Rudder attachment. Sequin Aviation rudder STC SA671SW failed. Ref: NTSB file 3-4158.
B30	Maule M-4-210C	30 Apr 78	1	S	Bethel, Alaska USA. Left horizontal stabilizer. NTSB file 3-3595.
B31	Canadair CL-41 Tutor (Canadian Forces)	3 May 78	1	D	Grande Prairie, Alta. Canada. Horizontal stabilizer separated. Crack at corner in stabilizer rear attachment fitting. Snowbird aerobatic team. Matl: 7075-T6. Ref: CF ACAIRS

B32	Piper PA-12 Super Cruiser	4 May 78	0	S	Rheine-Eschendorf, W. Germany. Horizontal stabilizer, front spar attachment. Ref: W. German file 3X0088.
B33	Cessna 150	9 Oct 78	0	S	Hamilton, Ont. Canada. Horizontal stabilizer, attachments. 5901 airframe hours. Ref: MOT Canada file 080088.
B34	Piper PA-32 Cherokee Six	1979	2	D	Marulan, NSW Australia. Right-hand stabilator failed. Ref: Australia
B35	Luscombe 8A	28 Oct 79	0	D	Fredericksburg, Texas USA. Vertical stabilizer & rudder separated (attachment failure). NTSB file 3-3331.
B36	D.H. DHC-2 Mk.1 Beaver	6 Dec 79	1	D	Captain's Flat, NSW, Australia. Vertical stabilizer separated (mounting bracket). Attach fitting damaged in prior accident. Role: agricultural. Ref: Australia DoT.
B37	Bellanca 8	1981	0	S	Archerfield, Qld. Australia. Two elevator ribs failed. Aircraft landed safely. Ref: Australia DoT.

Total Fatalities: 244

APPENDIX C

FIXED-WING AIRCRAFT - FUSELAGE

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
C1	Lockheed T-33 Silver Star (USAF)	1953-59	?	?	? Fuselage failure. Ref: J.D. Caldara, p 28 in WADC TR 59-507, 1959
C2	Boeing B-47 Stratojet (USAF)	1953-59	?	?	? Fuselage failure. Ref: J.D. Caldara, p 25 in WADC TR 59-507, 1959
C3	Martin B-57 (USAF)	1953-59	?	?	? Fuselage failure. Ref: J.D. Caldara, p 25 in WADC TR 59-507, 1959
C4	Republic F-84 Thunderstreak (USAF)	1953-59	?	?	? Fuselage failure. Ref: J.D. Caldara, p 20 in WADC TR 59-507, 1959.
C5	N. American F-86 Sabre (USAF)	1953-59	?	?	? Fuselage failure. Ref: J.D. Caldara, p 20 in WADC TR 59-507, 1959.
C6	D.H. Comet 1 (BOAC)	10 Jan 54	35	D	Mediterranean Sea off Elba, Italy. Fuselage fatigue failure, origin: ADF window. Ref: ICAO AAD No. 6, 1956, p. 16.
C7	D.H. Comet 1 (BOAC on charter to SAA)	8 Apr 54	21	D	Mediterranean Sea off Naples, Italy. Fuselage fatigue failure, origin: ADF window. Ref: ICAO AAD No. 6, 1956, p. 16.
C8	Douglas DC-7 (Delta)	18 Jan 57	0	S	New Orleans, La. USA. Mild explosive decompression. Fuselage cracks in area of forward crew entrance & cargo doors Ref: WAAS p 1/57.
C9	Lockheed Constellation	1958	0	S	? Aft pressure bulkhead. Crack propagated completely around circumference of bulkhead. Origin: corrosion in toilet area. 37,000 hours. Ref: J.K. Williams, p 108 in Gassner & Schutz, FATIGUE DESIGN PROCEDURES, 1969.
C10	Boeing B-52 Stratofortress (USAF)	19 Jan 61	8?	D	Monticello, Utah USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude. Ref: AWST May 13/63, p 26, & FI 5 Sept. 63 p. 414

C11	Boeing B-52 Stratofortress (USAF)	24 Jan 63	8?	D	Little Shanty Mountain, Maine USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude. Ref: AWST May 13/63, p 26, & FI 5 Sept. 63 p. 414
C12	Boeing B-52 Stratofortress (USAF)	30 Jan 63	8?	D	Mora, New Mexico USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude. Ref: AWST May 13/63, p 26, & FI 5 Sept. 63 p. 414
C13	Republic F-105B Thunderchief (USAF)	9 May 64	1	D	Hamilton Air Force Base, USA. Aircraft broke in two. Fuselage failure at tank cover, FS 350. Airframe hours: 600. Material: 7075-T6. Role: Thunderbird demo team. Ref: AWST May 18/64 p 38, & Dec. 14/64 p. 18; Merkin, AFFDL TR 70-144, p 799.
C14	Cessna 210	5 Jul 64	0	S	Richmond, Va. USA. Fuselage bulkhead assembly failed. Gear collapsed. Ref: NTSB file 3-1942.
C15	Republic F-105D-4 Thunderchief (USAF)	June 65	1?	D	USA? Fuselage failure at splice at fuselage tank cover, FS 350. Material: 7075-T6. Ref: Merkin, AFFDL TR 70-144, p 799, & AGARD CP-118, p. 54.
C16	Piper PA-25 Pawnee	20 Aug 65	0	S	Newellton, La. USA. Both upper fuselage longerons failed (poor weld). Ref: NTSB file 3-3516.
C17	Beechcraft C-45H	12 Nov 65	0	S	San Juan, P.R. USA. Right & left flanges of bulkhead cracked, allowing nose gear drag leg to retract. Ref: NTSB file 3-3340.
C18	Lockheed C-130 Hercules (Canadian Forces)	15 Apr 66	0	D	Borden, Sask. Canada. Explosive decompression of fuselage. Forward cargo door missing. Failure of #1 eye bolt. Origin: stress concentration (poor machining). Ref: CFAIRS.
C19	Douglas DC-6B (Northeast)	24 Feb 67	0	S	North Holmdel, N.J. USA. Fuselage: skin and attachments, 60" x 125" hole torn aft crew compartment door. 37,264 airframe hours. Ref: NTSB file 1-0021
C20	Boeing 707-349C	24 Sep 70	0	S	Enroute Shannon/London Loss of pressurization, fatigue of portion of external main cargo door skin. Ref: Ireland.
C21	Vickers 951 Vanguard (BEA)	2 Oct 71	63	D	Aarsele, Belgium. Rear bulkhead failure, causing separation of both tailplanes. Initiated by stress corrosion. Ref: Belgium AA.

C22	N. American Commander 681B	23 Feb 77	0	S	Ft. McMurray, Alta. Canada. Co-pilot's window shattered. Crazing on outer surface. Subsequent pressurization cycles caused fatigue rupture. 1769 airframe hours. Ref: MOT Canada file W70015
C23	Grumman G-44 Widgeon	30 Dec 78	0	S	Waitemata, New Zealand. Section of hull plating immediately forward of the step failed. Fatigue & stress corrosion. Ref: ICAO ADREP 493/78.
C24	Douglas DC-9-32 (Air Canada)	17 Sep 79	0	S	Between Boston USA & Yarmouth NS, Canada. Fatigue fracture of aft cabin pressure bulkhead (explosive decompression). Origin: rivet hole below aft bulkhead access door. Crack missed in prior inspections. 28,425 airframe hrs, 26,816 landings. Matl: Alclad 2014-T6. Ref: NTSB AAR-80-13.
C25	Lockheed L-188 Electra (Zantop)	18 Jan 80	0	S	Syracuse, N.Y. USA. Forward cargo door separated. Door latch loop (fastener holes). 37,794 airframe hours, 16,469 landings. NTSB file 1-0008.

Total Fatalities: 145

APPENDIX D

FIXED-WING AIRCRAFT - FLIGHT CONTROLS

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
D1	Latecoere 631	28 Mar 50	12	D	Cape Ferrett, France. Aileron control couplings, port wing. Ref: ICAO AAD No. 3, 1953, p 7; "HISTOIRE DE L'AERONAUTIQUE FRANCAIS - L'EPEPEE 1940-60", p. 108.
D2	Avro CF-100 Canuck (Canadian Forces)	21 Apr 54	2	D	North Bay, Ont. Canada. Outboard hinge bracket of starboard flap. Ref: CF ACAIRS
D3	Avro CF-100 Canuck (Canadian Forces)	19 Jun 56	2	D	Bagotville, Que. Canada. Outboard hinge bracket of starboard flap. Flap separated. Ref: CFAIRS.
D4	Vickers Viscount 701 (BEAC)	14 Mar 57	20	D	Manchester, England. Bolt failure, starboard no. 2 flap attachment. Ref: ICAO AAD No. 9, 1959, p. 76
D5	PZL-102 Kos	13 May 62	2	D	Joensuu Airport, Finland. Supporting bracket of pedal. Ref: Finland BoA.
D6	Piper PA-18 Super Cub	31 Jan 64	0	S	Lewiston, Id. USA. Rudder cable attachment fitting lug. Ref: NTSB file 3-0386.
D7	Cessna 170	4 Oct 64	0	S	Effingham, Ill. USA. Left rudder cable. Ref: NTSB file 3-3106
D8	Luscombe 8A	16 Jan 65	0	S	Colliston, Utah. USA. Left rudder cable. Ref: NTSB file 3-0234.
D9	Piper PA-25 Pawnee	2 Jun 65	1	D	Clarendon, Ark. USA. Fracture in elevator tab control system. Role: aerial application. NTSB file 2-0582
D10	N. American SNJ-5 Texan	14 Aug 65	0	S	Monroeville, Pa. USA. Left rudder cable. Ref: NTSB file 3-2237
D11	Cessna 172G	26 Dec 65	0	S	Streator, Ill. USA. Left aileron push-pull rod. NTSB file 3-4008.
D12	Beech C-45H	3 Mar 67	0	S	Janesville, Wis. USA. Fabric separation at elevator trim tab hinge and elevator-horizontal stabilizer hinge areas. Ref: NTSB file 3-0556.

D13	Vickers Super VC.10 (BOAC)	9 Aug 67	0	S	New York, N.Y. USA. Section of starboard flap separated (broken lug on flap trolley). Ref: WAAS p. 17/67.
D14	CallAir A-9	16 Aug 67	1	D	Knobel, Arkansas USA. Fracture of right rudder cable, which was chafing against off-centre fairlead. Role: aerial application. NTSB file 2-0528
D15	General Dynamics F-111A (USAF)	28 Mar 68	2	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Aircraft not recovered. Ref: FI 20 June 68 pp 934-935 & 4 Apr/68 p 498.
D16	General Dynamics F-111A (USAF)	30 Mar 68	0	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Aircraft not recovered. Ref: FI 20 June 68 pp 934-935 & 4 Apr/68 p 498.
D17	General Dynamics F-111A (USAF)	22 Apr 68	2	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Aircraft not recovered. Ref: FI 20 June 68 pp. 934-935 & 2 May 68 p. 655.
D18	General Dynamics F-111A (USAF)	8 May 68	0	D	Nevada, USA. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Ref: FI 20 June 68 pp. 934-935.
D19	Ambassador AS.57 Series 2 (B.K.S. Air Transport)	3 Jul 68	6	D	Heathrow Airport, London England. Failure of port flap operating rod, permitting flap to retract. Ref: ICAO AAD No. 18 Vol. II, p. 121
D20	Boeing 707 (Trans World)	26 Jul 69	5	D	Pomona, N.J. USA. Hydraulic system, port outboard spoiler downline. Loss of fluid in control system for rudder & rudder tab caused loss of directional control. Role: training. Ref: NTSB file 1-0017
D21	Cessna 172	17 Jan 71	0	S	Claypool, Ind. USA. Right aileron push-pull rod assembly broken. Ref: NTSB file 3-0534.
D22	Avro CF-100 Canuck (Canadian Forces)	3 Mar 72	0	D	Mt. Tremblant Park, Que. Canada. Aileron trimmer tab fitting failed (fatigue and stress corrosion). Ref: CFAIRS.
D23	Hawker Siddley Harrier GR.3 (Royal AF)	23 Jan 74	1	D	Wildenrath, West Germany. Starboard flap mechanical drive system. Ref: RAF.

D24	Hirth Acrostar Mk 2	4 Jul 74	1	D	Straubing-Wallm. West Germany. Failure of control system. Unapproved modification. Ref: West German file 3X0298.
D25	Erco 415-C Ercoupe	22 Mar 75	1	D	Fulton, Mo. USA. Right aileron push-pull control rod broken. Ref: NTSB file 3-0603
D26	Boeing 747-136 (British Airways)	16 May 75	0	?	Prestwick, Scotland. Right inboard wing trailing edge foreflap detached. Crack in outboard sequence carriage attachment fitting at horiz flange. Ref: WAAS p. 10/75; & UK AIB AAR 13/76.
D27	Scheibe SF-26A sailplane	25 May 75	0	D	Perris, Ca. USA. Right aileron bellcrank. Ref: NTSB file 3-2575
D28	Cessna 320B	6 Jun 75	0	S	Bowling Green, Ky. USA. Elevator push-pull rod attach rivets. Ref: NTSB file 3-1657.
D29	Grumman AA-1B	31 Jul 75	0	S	St. Andrews, Man., Canada. Left rudder centering spring. Ref: MoT Canada file C50104.
D30	UTVA Weihe	11 Jul 76	0	S	Alte Ems, W. Germany. Left hand rudder cable. Ref: W. German file 3X0333.
D31	Cessna 172	3 Jun 77	0	S	Basking Ridge, N.J. USA. Flap switch, down to neutral position spring broken. Ref: NTSB file 3-1456.
D32	Erco 415-C Ercoupe	15 Jun 77	2	D	New Bedford, Mass. USA Left horizontal member of the T-control yoke (weld). Hydrogen embrittlement & fatigue. Ref: NTSB file 3-1280
D33	Schleicher K 8	10 Jul 77	0	D	Guetersloh, W. Germany. Elevator control rod. Ref: W. German file 3X0309.
D34	Cessna 337 Super Skymaster	30 Sep 77	0	S	Kingston, Ont. Canada. Upper rod, between bellcrank and elevator balance weight arm (threads). Ref: MoT Canada file 070909.
D35	Scheibe Zugvogel III-B	10 Sep 78	0	S	Kreuzberg-Kronach, W. Germany. Right spoiler drive. Ref: W. German file 3X0411
D36	Boeing 747SR-100 (JAL)	11 Nov 78	0	S	Osaka, Japan. Flap track bolts of right outer trailing edge flap. Ref: Japan MoT.

D37	Pietenpol B4 Aircamper	8 Jul 79	1	D	Mesa, Arizona USA. Elevator push-pull bellcrank mounting steel tube. NTSB file 3-2126
D38	Grumman G-21A Goose	17 Sep 79	1	S	Avalon, Calif. USA. Up elevator cable separated 3 to 4 ft. forward of station 29. NTSB file 3-3075
D39	RLU Breezy RLU-1	22 Sep 79	2	D	Frazer, Mi. USA. Lower weld in aileron cable pulley bracket. (Weld surface heavily oxidized.) Ref: NTSB file 3-2408.
D40	Piper PA-25 Pawnee	1980	0	D	Sassafras, Tas. Australia. Up-elevator cable rear turnbuckle failed. Non-corrosive resistant bolt fitted & overtightened. Ref: Australia DoT.
D41	McDonnell Douglas DC-8-61	13 Jan 80	0	S	Gander, Nfld., Canada. Left flap support fitting at station XF219.498 fractured, and 2 flap hinge base fittings at station XW97.906 fractured. Ref: Jamaica.
D42	Glasfluegel Standard Libelle	1 May 80	0	S	Tauberbischofsh., W. Germany. Elevator drive in region of stick. Ref: W. German file 3X0094.
D43	Pitts S-1S	4 May 80	1	D	Fort Wayne, In. USA. Elevator push-pull tube at rod end bearing (lack of lubrication). NTSB file 3-3018.
D44	Lockheed CF-104 Starfighter (Canadian Forces)	27 Aug 80	0	D	Terschelling Is., Netherlands. Left leading-edge flap separated. Failure of forward beam hinge lobes. Ref: CFAIRS.
D45	Hawker Siddley Harrier GR.3 (Royal AF)	14 Oct 80	1	D	Gutersloh, W. Germany Failure of roll reaction control rod from starboard aileron to roll reaction shutter. Ref: FI 25 July 81, p. 221.
D46	Maule M5	1981	0	S	Bankstown NSW, Australia. Right rudder-pedal torque tube (weld). Ref: Australia DoT.
D47	Varga 2150A Kachina	31 Jul 81	2	D	Stevensville, Md. USA. Elevator horn failed. Ref: NTSB file 3-2084.
D48	Hirth Acrostar	19 Sep 82	0	D	Pau, France. Tube in which (elevator) stick is mounted was broken on one side. Ref: FI 11 Dec. 82 p 1671.

Total fatalities: 68

APPENDIX E

FIXED-WING AIRCRAFT - ENGINE OR TRANSMISSION

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
E1	Handley Page W.10 (Imperial Airways)	17 Jun 29	7	D	English Channel near Dungeness, England. Steel studs in front big-end bearing of starboard engine. Ref: IRON AGE, 5 Sept/29, p p 600; The Aeroplane, 19 Jun 29, p 1008.
E2	Douglas DC-3 (Viking Air Transport)	16 May 46	27	D	Richmond, Va. USA. Crack in no. 6 cylinder of left engine. Ref: WAAS p 3/44 & Aviation News, 10 March/49 p 20.
E3	Douglas DC-3 (Trans-Luxury Airlines)	21 Aug 46	2	D	Moline, Ill. USA. No. 5 cylinder fractured at barrel between fins & flange. Ref: Aviation News 16 Dec/46 p 14 & 2 Sept. 46 p 17
E4	Lockheed L-049 Constellation (Pan American)	18 Jun 47	14	D	Mayadine, Syria. No. 18 exhaust rocker arm of no. 1 engine. Ref: AW July 12/48 p. 48, & WAAS p 11/47.
E5	Douglas Dakota (BEA)	30 Jul 48	0	D	Sywell, UK. Malfunction of starboard engine, constant speed unit due to fatigue failure of filter gauze. Ref: WAAS p. 16/48.
E6	Curtiss C-46F (Miami Airline)	16 Dec 51	56	D	Newark, N.J. USA. Hold-down studs of no. 10 cylinder, right engine. Ref: ICAO AAD No. 3, 1953, p. 84
E7	Douglas DC-3 (Sabena)	4 Feb 52	16	D	Kitwit, Belgian Congo. No. 6 piston lug failed, shearing off propeller. Ref: Belgium AA.
E8	Handley Page Hermes IV (Airwork)	23 Jul 52	0	D	Pithiviers, France. Crankshaft web. Ref: Barnes, HANDLEY PAGE AIRCRAFT SINCE 1909, pp 469-470.
E9	Handley Page Hermes IV (Airwork)	25 Aug 52	7	D	Trapani, Sicily. Crankshaft web. Ref: Barnes, HANDLEY PAGE AIRCRAFT SINCE 1909, p 470.
E10	Avro CF-100 Canuck (Canadian Forces)	11 Aug 53	2	D	St-Hubert, Que. Canada. Failure of a Banjo bolt fitting in fuel system of starboard engine caused double flameout. Ref: CF ACAIRS

E11	Convair 240 (American Airlines)	4 Aug 55	11	D	Fort Leonard Wood, Missouri, USA. Crack in cylinder wall of engine, causing fire & separation of wing. Unairworthy cylinder installed. Ref: ICAO AAD No. 7, 1957, p 160.
E12	Douglas DC-7C (SAS)	29 Oct 57	0	S	Off US coast, NY/Copenhagen. No. 1 engine impeller drive gear. Ref: WAAS p 20/57.
E13	Curtiss C-46F (Aerovias Sud Americana)	6 Nov 57	2	D	Guatemala City, Guatemala. Crankshaft of port engine. Ref: ICAO AAD No. 9, 1959, p. 219.
E14	Douglas DC-7C (Braniff)	25 Mar 58	9	D	Miami Fla. USA. No. 11 cylinder of no. 3 engine (above mounting flange). AW Feb. 9/59 pp 103-123.
E15	Miles M.65 Gemini	4 Mar 59	1	D	Panshanger Aerodrome, Hertford U.K. Crankshaft of starboard engine. Ref: Ministry of Aviation C.A.P 171, 1961.
E16	Cessna T-50	4 Apr 59	0	S	Kasigluk, Alaska, USA. Crankshaft, next to rear side of propeller thrust nut. Ref: USACAD.
E17	Helio H-395 Super Courier	16 Sep 59	0	S	McMurray, Alta. Canada. Connecting rod bearing cap retaining bolt. Ref: MoT Canada file 777.
E18	Curtiss C-46 (Pacific Western)	29 Jan 60	0	D	Port Hardy, B.C. Canada. Reduction drive ring gear in right engine. Ref: WAAS p 3/60.
E19	Curtiss C-46A (Lineas Aereas de Nicaragua)	5 Apr 60	2	D	Siuna Aerodrome, Nicaragua. Port engine failed due to fatigue of distributor valve of port propeller. Ref: ICAO Circular 64-AN/58, 1963, p. 156.
E20	Helio H-391B Courier	19 May 60	0	S	Watson Lake, Y.T. Canada. Movement between stationary gear plate and reduction gear housing permitted severe engine vibration and fatigue failure of bolts. Ref: MoT Canada file 970.
E21	Douglas DC-3 (Ozark)	6 Sep 60	0	S	Des Moines, Iowa, USA. No. 10 cylinder exhaust insert mounting of right engine. Ref: USACAD.
E22	de Havilland DHC-3 Otter	16 Sep 60	0	S	Frobisher Bay, NWT. Canada. Crankshaft at mating splines between front and rear halves. Ref: MoT Canada file 1116.
E23	Curtiss C-46F (Capitol Airlines)	22 Jan 61	2	D	Katy, Texas, USA. No. 8 cylinder hold-down studs. Uncontrollable fire and separation of wing. Ref: WAAS p. 1/61

E24	Curtiss C-46F	28 Aug 61	0	S	Fairbanks, Alaska. USA. Holddown studs, no. 8 cylinder, left engine. Ref: WAAS p. 18/61.
E25	Fleet 80 Canuck	9 Oct 61	0	S	Trinity Bay, Que. Canada. Left-rear cylinder hold down studs. Ref: MoT Canada file 1503.
E26	Boeing 720 (United)	1 Feb 62	0	S	Portland, Ore. USA. Third stage compressor blades. Origin: trailing edge corner of dovetail on convex side of blade Ref: WAAS p. 3/62.
E27	Douglas Dakota (Darbhanga)	24 May 62	4	D	Rajshani, E. Pakistan. Port engine. Ref: WAAS p. 13/62.
E28	Cessna 195	14 Jun 62	0	D	Kaouk River, B.C. Canada. Crankshaft. Ref: MoT Canada file 1698.
E29	de Havilland Comet 4 (BOAC)	11 Oct 62	0	S	London, UK. '0' stage compressor blade, no. 3 engine. Ref: WAAS p. 26/62.
E30	Turbulent	26 May 63	0	D	Guildford, UK. Crankshaft. Ref: FI 2 Jan 64 p 32
E31	Stinson 108	26 Jan 64	0	S	Hammond, La. USA. No. 5 cylinder at barrel casting. Ref: NTSB file 3-0391.
E32	Meyers 200B	17 Feb 64	0	S	Cleveland, Ohio. USA. No. 5 cylinder. Ref: NTSB file 3-0379.
E33	Cessna 182	6 Mar 64	0	D	Sedalia, Mo. USA. Master & connecting rods. Ref: NTSB file 3-0605
E34	de Havilland DHC-1 Chipmunk	26 Apr 64	0	S	Orillia, Ont. Canada. Crankshaft at tapered propeller end. Caused prop separation. Ref: MoT Canada file 2295.
E35	Beech C50 Twin Bonanza	14 May 64	0	S	Concord, N.H. USA. High pressure fuel line. NTSB file 3-1280
E36	Bellanca 14-13	14 Jul 64	0	S	North Creek, N.Y. USA. Crankshaft. Ref: NTSB file 3-2073.
E37	Cessna 182A	25 Jul 64	2	D	Juneau, Alaska, USA. Master & connecting rods. Ref: NTSB file 2-0586
E38	Douglas DC-3	19 Aug 64	0	D	Tonopah, Nevada, USA. Fractures of right engine no. 12 cylinder, and left engine front master rod bearing. Ref: WAAS p. 18/64

E39	Boeing 75N1 Stearman	19 Sep 64	0	S	Lepanto, Ark. USA. Crankshaft, next to front thrust bearing. Ref: NTSB file 3-2949.
E40	Piper PA-22	31 Oct 64	0	D	Hanover, Ont. Canada. Crankshaft bearing failure caused fatigue crack in crank throw. Ref: MoT Canada file 2415.
E41	Navion B	27 Jan 65	0	S	Flushing, N.Y. USA. No. 4 bearing cap bolt. Ref: NTSB file 2-0037.
E42	Cessna 175	6 Feb 65	0	S	Brawley, Cal. USA. Crankshaft. Ref: NTSB file 3-3872.
E43	Navion B	7 Mar 65	0	S	Englewood, Fla. USA. Heater muffler at exhaust stack attachment. Ref: NTSB file 3-0460.
E44	Boeing PT-13 Stearman	15 Mar 65	0	S	Legrand, Cal. USA. Crankshaft at thread area of thrust bearing nut. Ref: NTSB file 3-0398.
E45	Globe GC-1B	27 Mar 65	0	S	New Carlisle, Ohio. USA. No. 2 piston. Ref: NTSB file 3-0759.
E46	Navion A	1 Apr 65	0	D	Coon Rapids, Minn. USA. No. 1 piston. Ref: NTSB file 3-1225.
E47	Cessna 140	14 Apr 65	0	S	Tulsa, Okla. USA. No. 2 cylinder. Ref: NTSB file 3-1180.
E48	Luscombe 8C	18 Apr 65	0	D	Laguna Beach, Calif. USA. Engine crankshaft. Ref: NTSB file 3-0773.
E49	Piper PA-18 Super Cub	24 Apr 65	1	D	Dell, Montana USA. Fracture in muffler obstructed exhaust gas flow. Backpressure caused power failure. Ref: NTSB file 2-0325.
E50	Boeing 720B (Continental)	3 May 65	0	S	Los Angeles, Cal. USA. No. 2 engine 2nd stage fan disc (spacer hole). Ref: NTSB file 1-0052.
E51	Piper PA-22	13 May 65	0	S	Jeffersonville, Ind. USA. Crankshaft flange. Ref: NTSB file 3-1286.
E52	Grumman G-164 AgCat	8 Jun 65	0	S	Tallulah, La. USA. No. 4 cylinder connecting rod. NTSB file 3-1405.
E53	Cessna TL-19D	15 Jun 65	0	S	Almyra, Ark. USA. Fuel mixture control arm. Ref: NTSB file 3-3736
E54	Aero Commander 680	21 Jun 65	0	S	Cleveland, Ohio. USA. No. 4 cylinder. Ref: NTSB file 3-1459.

E55	Stinson 108-2	24 Jun 65	0	D	Kenosha, Wis. USA. No. 4 cylinder exhaust valve. NTSB file 3-2096.
E56	Lockheed CF-104 Starfighter (Canadian Forces)	5 Jul 65	0	D	Zweibrucken, Germany. Main fuel pump drive splines (lack of lubrication). Ref: CFAIRS.
E57	Cessna 210E	19 Jul 65	0	S	McCracken, Kans. USA. No. 3 cylinder connecting rod. NTSB file 3-3275.
E58	Aeronca 7AC Champion	10 Aug 65	0	S	Warrington, Pa. USA. No. 2 cylinder exhaust valve. NTSB file 2-0443.
E59	Curtiss C-46A (Paranese Transport Aereos)	12 Aug 65	13	D	Barra do Bugres, Brazil. Bolts of no. 8 cylinder, left engine. Engine fire caused wing separation. Ref: ICAO AAD No. 17 Vol. 1, p. 171.
E60	Stinson 108-2	4 Sep 65	0	S	Oak Hill, W.Va. USA. No. 6 cylinder exhaust valve. NTSB file 3-2628
E61	Piper PA-22	6 Sep 65	0	S	Clermont, Ind. USA. Muffler (baffle failed). Ref: NTSB file 3-2770
E62	Cessna 180B	27 Sep 65	1	D	Lake Corneau, Que. Canada. No. 2 piston. Ref: MoT Canada file 2735.
E63	Beechcraft C-45H	11 Oct 65	0	S	Kauai, Hawaii. USA. Fuel line to carburettor at fitting to carb. Ref: NTSB file 3-3115.
E64	Beech 35 Bonanza	12 Oct 65	0	S	Carlsbad, Cal. USA. Magneto switch. Ref: NTSB file 3-2969.
E65	Cessna 170B	13 Oct 65	0	S	Silverdale, Wash. USA. Valve assemblies fatigue fracture. Exhaust valve burned, spark plugs excessively worn. Ref: NTSB file 3-3680.
E66	Piper PA-24 Commanche	4 Nov 65	0	S	Homer, Ga. USA. No. 3 cylinder connecting rod cap bolts. Ref: NTSB file 3-3998.
E67	Piper PA-24 Commanche	5 Nov 65	0	S	Red Bluff, Cal. USA. Generator brushes. Ref: NTSB file 3-3262.
E68	Cessna 182B	29 Nov 65	0	S	Mokelumne Park, Cal. USA. Crankshaft gear. Ref: NTSB file 3-3522.
E69	Piper PA-22	1 Dec 65	0	D	Beaufort, S.C. USA. Exhaust muffler inlet pipe. Ref: NTSB file 3-3570.
E70	Cessna 182	10 Dec 65	0	S	Hot Springs, Ark. USA. No. 6 cylinder exhaust valve. NTSB file 3-3763.

E71	Piper PA-24 Commanche	15 Jan 66	0	S	Montgomery, La. USA. No. 1 cylinder exhaust valve. NTSB file 3-0044.
E72	Cessna 150F	22 Jan 66	0	S	West Los Angeles, Cal. USA. No. 1 connecting rod. Ref: NTSB file 3-0243.
E73	Piper J-3C	25 Jan 66	0	S	Chesapeake, Va. USA. No. 2 cylinder exhaust valve. NTSB file 3-0125.
E74	Vickers Viscount (Air Inter)	6 Feb 66	0	S	Lyons/Paris, France. Annulus gear in reduction section of #1 engine. Ref: WAAS p. 4/66.
E75	Boeing 720 (Braniff)	13 Feb 66	0	S	Dallas, Tex. USA. Turbine spacer, wheel. Ref: NTSB file 1-0007.
E76	Piper PA-22	24 Feb 66	0	S	Hamburg, N.Y. USA. Exhaust pipe cracked. Ref: NTSB file 3-0698.
E77	Cessna 185C	26 Feb 66	0	S	Morgan City, La. USA. Crankshaft at propeller mounting flange. Ref: NTSB file 3-0383.
E78	Grumman G-44 Widgeon	15 Mar 66	0	S	Port Alberni, B.C. Canada. Crankshaft at grinding crack in cheek of fillet of no. 4 bearing journal. MoT Canada file 2864.
E79	Beech 35 Bonanza	10 Apr 66	0	S	Texico, N.Mex. USA. Carburetor alternate air door hinge. Ref: NTSB file 3-0904.
E80	Grumman G-164 AgCat	20 Apr 66	0	S	Butte City, Cal. USA. Wrist pin and link rod, no. 1 cylinder. Ref: NTSB file 3-0860.
E81	Luscombe 8E	15 May 66	0	S	Eau Gallie, Fla. USA. Crankshaft cluster gear attaching screws. Ref: NTSB file 3-2465.
E82	de Havilland DHC-3 Otter	16 Jun 66	0	S	Pocketknife Creek, B.C. Canada. Bushing in no. 2 cylinder exhaust rocker box casting. Ref: MoT Canada file 2983.
E83	Cessna 172	3 Jul 66	0	S	Huntsville, Ont. Canada. No. 1 cylinder barrel between 6th and 7th cooling fins. Ref: MoT Canada file 3003.
E84	Cessna 310	10 Jul 66	2	D	Longmont, Colo. USA. Fracture at poor weld in exhaust, caused fuel fire & separation of right wing. NTSB file 2-0572.
E85	Boeing IB75A Stearman	23 Jul 66	1	D	Valparaiso, Ind. USA. Crankshaft. Prop shaft separated at thrust nut threads, prop hit wing brace & wing folded. Role: aerobatics. NTSB file 2-0629

E86	Taylorcraft BC-65	2 Aug 66	0	S	Midland, Mich. USA. Throttle shaft separated from carburetor throttle arm. Ref: NTSB file 3-2410.
E87	Cessna 140A	25 Aug 66	0	S	Sikes, La. USA. No. 3 cylinder exhaust valve. NTSB file 3-2286.
E88	Navion A	8 Sep 66	0	S	Phillipstown, N.Y. USA. Crankshaft accessory drive gear dowel pin and attach screws failed. Ref: NTSB file 3-2623.
E89	Douglas DC-4 (Avianca)	22 Sep 66	2	D	Bogota, Colombia. Failure of a number of teeth of pinion of governor control unit, causing engine overspeed. Ref: WAAS p. 27/66.
E90	Vickers Viscount 724 (Air Canada)	17 Dec 66	0	S	Edmonton, Alta. Canada. 1st stage impeller, no. 3 engine compressor. Ref: MoT Canada file 3227.
E91	Aero Commander 560E	21 Feb 67	4	D	Tahoe Valley, Calif. USA. Impulse coupling cam assembly on magnetos. Ref: NTSB file 2-1083.
E92	Luscombe 8E	23 Apr 67	0	D	Laguna Beach, Calif. USA. Camshaft rear bearing journal in area of flange fillet. Ref: NTSB file 3-1283.
E93	Saab-Scania S35E Draken (Swedish AF)	10 May 67	0	D	Soderkoping, Sweden. Compressor blade. Ref: Swedish AF
E94	CallAir A-9	8 Jun 67	0	D	Belvidere, S. Dakota USA. Outlet connector at fuel selector failed. Role: Crop spraying. Ref: NTSB file 3-2055.
E95	Navion B	18 Jun 67	0	S	Stoney Plain, Alta. Canada. Studs attaching stationary gear drive plate to interior of reduction gear housing. Ref: MoT Canada file 3441.
E96	Helio 395A Super Courier	30 Jul 67	0	?	Cullaton Lake, NWT. Canada. No. 4 cylinder exhaust valve. Ref: MoT Canada file 3539.
E97	Aeronca 7AC Champion	15 Aug 67	0	S	Commerce, Tex. USA. Loose prop retainer nut caused cracking of crankshaft. Ref: NTSB file 3-2928.
E98	Republic RC-3 Seabee	20 Oct 67	0	S	Goleta, Cal. USA. Mixture control cable bracket. NTSB file 3-3688.
E99	Beech E18S	8 Jan 68	3	D	San Diego, Calif. USA. Cracked shroud, 3rd stage stator assembly. Ref: NTSB file 3-4633

E100	Piper PA-28 Cherokee	14 Jan 68	0	S	Hazelhurst, Ga. USA. No. 2 connecting rod. Ref: NTSB file 3-0045.
E101	Cessna 150F	7 Mar 68	0	S	Findo-Gask, Perthshire, UK. Engine cylinder. Ref: UK BoT C.A.P. 327 p 27.
E102	Boeing 707-465 (BOAC)	8 Apr 68	5	D	Heathrow Airport, London England. No. 5 low pressure compressor wheel. Ref: ICAO AAD No. 18 vol. II, 1971, p. 79.
E103	Piper J-4	5 May 68	0	S	Berlin, N.J. USA. Crankshaft failed in keyway. NTSB file 3-1380.
E104	Piper PA-22	23 Jun 68	0	S	Lac Baron, Que. Canada. Bolt of no. 2 connecting rod. Ref: MoT Canada file 3942.
E105	Piper PA-25 Pawnee	5 Jul 68	0	S	Bosco, La. USA. Left magneto shaft. NTSB file 3-1747.
E106	Piper PA-25 Pawnee	25 Aug 68	0	S	David City, Neb. USA. Mixture control wire failed in bend radius. Ref: NTSB file 3-2809.
E107	Grumman G-164A AgCat	16 Sep 68	0	S	Ferriday, La. USA. No. 9 cylinder head. Ref: NTSB file 3-3295.
E108	Cooney R-1 Tomcat	24 Sep 68	0	S	Lamoni, Iowa. USA. Crankshaft. Ref: NTSB file 3-3233.
E109	Piper PA-22	29 Sep 68	0	S	Cumberland, Md. USA. Camshaft gear attach bolts. NTSB file 3-3302.
E110	Cessna 150G	1969	0	S	King Is Ad, Tas. Australia. Exhaust valve rocker arm. Ref: Australia DoT.
E111	Cessna P206	1969	0	S	Port Headland, WA., Australia. No. 5 cylinder head at threads. Australia DoT.
E112	Cessna 310F	19 Feb 69	4	D	Reno, Nev. USA. Master & connecting rods. Ref: NTSB file 3-2460
E113	Aero Commander A-9B	8 Mar 69	0	S	Selma, Cal. USA. Crankshaft at no. 5 crankpin. NTSB file 3-0355.
E114	Dutton SPL J-4	13 Apr 69	0	S	Mesa, Ariz. USA. Crankshaft at propeller flange. Previous damage. Ref: NTSB file 3-0856.
E115	Lockheed 18-56 Lodestar	17 Apr 69	0	S	Port Hardy, B.C. Canada. Piston link rod, left engine. Ref: MoT Canada file F-525.
E116	Piper PA-22	26 Apr 69	0	S	Chenango Bridge, N.Y. USA. No. 4 cylinder barrel. Ref: NTSB file 3-0875.

E117	Boeing 75 Stearman	9 May 69	0	S	Five Points, Cal. USA. Crankshaft broken in thrust nut thread area. Ref: NTSB file 3-1159.
E118	Cessna 195	22 May 69	1	D	Flat Lake, Ont. Canada. No. 4 & 5 conrods failed due to no. 4 knuckle pin failure. Ref: NTSB file 6-0080
E119	Mooney M20C	23 Jun 69	1	D	Banff, Alta. Canada. Engine failure, fatigue of rigid oil-pressure line, propeller governor to crankcase. Ref: MoT File 5002-4396.
E120	General Aircraft 42 Cygnet II	26 Aug 69	2	D	Woerth, Bas-Rhin, France. No. 3 connecting rod. Ref: UK BoT CAP 351 p 22
E121	Douglas DC-8 (Eastern)	28 Nov 69	0	S	Newark, N.J. USA. 12th stage compressor disc, no. 4 engine. Ref: NTSB file 1-0054.
E122	Cessna 177	1970	0	S	Randalls Bay, Tas., Australia. Oil line failed due not modified type. Ref: Australia DoT.
E123	Handley Page Jetstream	6 Mar 70	11	D	Samedan, Switzerland. 1st stage turbine disc of left engine. Material: Udimet 500. Ref: WAAS p. 8/70
E124	Piper PA-32 Cherokee SIX	12 Apr 70	0	D	Belle, Mo. USA. Foreign piece of metal enmeshed in crankshaft idler gear, causing gear failure. Ref: NTSB file 3-1391.
E125	McDonnell Douglas DC-8-60 (SAS)	19 Apr 70	0	D	Rome, Italy. Hub 1st stage fans of no. 1 engine. Ref: ICAO ADREP 128/70.
E126	Aero Commander 200-D	30 Apr 70	0	S	Woodstock, Ga. USA. No. 2 conrod. Ref: NTSB file 3-4610.
E127	Saab-Scania S35E Draken (Swedish AF)	3 Jun 70	0	D	Aalborg, Denmark. Compressor blade. Ref: Swedish AF
E128	Cessna 170A	6 Jun 70	0	S	Greenfield, Ind. USA. No. 4 connecting rod. Ref: NTSB file 3-1220.
E129	Boeing A75 Stearman	13 Jun 70	0	S	Sacramento, Cal. USA. No. 1 cylinder. Ref: NTSB file 3-2604.
E130	Boeing 727 (Eastern)	16 Jun 70	0	S	Boston, Mass. USA. Compressor disc, 11th stage. NTSB file 4-0063.

E131	Grumman TBM-3 Avenger	21 Jun 70	1	D	St. Martin, N.B. Canada. Front bank master rod. MoT Canada file A0905.
E132	Boeing 707 (BOAC)	22 Jun 70	0	S	London, UK. Disk diaphragm at runout of outboard radius of front integral spacer (8th stage HP compressor, no. 1 engine). Ref: WAAS p 15/70.
E133	Aero Commander S-2R	27 Jun 70	0	S	Eudora, Ark. USA. Main governor drive gear sheared. Ref: NTSB file 3-2714.
E134	Cessna 150	13 Jul 70	0	S	Deer Park, N.Y. USA. Crankshaft broke at no. 4 web above journal. Ref: NTSB file 3-2590.
E135	Saab-Scania A32A Lansen (Swedish AF)	13 Aug 70	0	D	Oxelosund, Sweden. Fuel pipe. Ref: Swedish AF
E136	Saab-Scania S35E Draken (Swedish AF)	16 Sep 70	0	D	Arvidsjaur, Sweden. Compressor blade. Ref: Swedish AF
E137	Piper PA-18 Super Cub	3 Oct 70	0	S	Loxley, Ala. USA. Carburetor cracked around back side of throat. Ref: NTSB file 3-3891.
E138	Jodel F-11	17 Oct 70	0	S	Vernon, Ont. Canada. Crankshaft (improper reconditioning). Ref: MoT Canada file 00096.
E139	Piper PA-23 Aztec	30 Nov 70	0	S	Doylestown, Pa. USA. Engine controls mount bracket assembly failed at pedestal. Ref: NTSB file 3-2406.
E140	Lockheed TV-2	4 Dec 70	0	D	Cheyenne, Wyo. USA. Fatigue fracture, turbine assembly retention, blade. Ref: NTSB file 3-2173.
E141	Piper PA 25-235 Pawnee	1971	0	D	Moura, Queensland Australia. Fatigue of mixture control part. (Not genuine part.) Ref: Australia DoT
E142	Auster 5D	1971	0	S	Camden NSW, Australia. Valve assembly. Ref: Australia DoT.
E143	McDonnell CF-101 Voodoo (Canadian Forces)	18 Feb 71	0	D	Comox. B.C. Canada. Starboard J57 engine compressor blade. Origin: platform area. Ref: CFAIRS.
E144	Cessna 210K Centurion	24 Mar 71	1	D	Roganville, Texas, USA. Fillets of no. 2 main journal. NTSB file 3-0197.

E145	Stinson V-77	2 Apr 71	0	S	Pleasant Plain, Ohio. USA. # 2 connecting rod (upper end). NTSB file 3-2156.
E146	Aero Commander A-9B	16 Apr 71	0	D	Purvis, Miss. USA. No. 5 conrod. Role: Spraying. NTSB file 3-1184
E147	Beech 23 Musketeer	16 May 71	0	S	Yuma, Ariz. USA. Aux fuel pump fitting (prior partial fracture). Ref: NTSB file 3-3886.
E148	Piper PA-28R Cherokee	17 Jun 71	0	S	Garnett, Kans. USA. Crankshaft (front portion of # 3 main journal). Ref: NTSB file 3-2095.
E149	Boeing 707 (American)	21 Jul 71	0	S	Dallas, Tex. USA. No. 3 engine, segment of no. 1 fan disk. Ref: WAAS p. 14/71.
E150	Victa 210 CS	30 Jul 71	0	S	Cromwell, New Zealand. Fuel discharge tube. Ref: NZ brief 71-074.
E151	Cessna 172C	7 Aug 71	0	S	Elmo, Pa. USA. Engine mixture control wire. NTSB file 3-2929.
E152	North American AT-6G	27 Sep 71	2	D	Davis Creek, Calif. USA. Fracture in heater shroud allowed engine exhaust to enter cockpit. NTSB file 3-4550
E153	Beech A35 Bonanza	8 Oct 71	0	S	Campo, Cal. USA. # 2 cylinder hold-down studs. NTSB file 3-4007.
E154	Douglas DC-3C	11 Oct 71	0	S	New Braunfels, Tex. USA. Fuel press ind/oil dilution restrictor fitting on right carb. Ref: NTSB file 3-3318.
E155	Piper PA-28R Cherokee	26 Oct 71	0	S	La Porte, Tex. USA. # 4 conrod cap. Ref: NTSB file 3-4199.
E156	Boeing 747 (Eastern)	8 Nov 71	0	S	Jamaica, N.Y. USA. No. 1 engine diffuser case near the no. 5 boroscope boss. Ref: WAAS p. 22/71. ICAO ADREP 1471/71.
E157	Aero Commander A-9B	10 Nov 71	0	S	Elmira, Cal. USA. Forward fillet of # 3 main journal of crankshaft. Ref: NTSB file 3-4449.
E158	Beech M35 Bonanza	23 Nov 71	0	S	Owosso, Mich. USA. Crankshaft. Ref: NTSB file 3-3301.
E159	Snow Commander S2D	6 Dec 71	0	S	Thompson Town, Jamaica. Master connecting rod at crank pin end. Ref: Jamaica.

E160	Beech 65-80 Queen Air	9 Dec 71	7	D	Oklahoma City, Okla. USA Left engine no. 5 conrod cap. Ref: NTSB NTSB file 3-3981
E161	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine. Ref: AWST 3 Apr 72, p. 11.
E162	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine. Ref: AWST 3 Apr 72, p. 11.
E163	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine. Ref: AWST 3 Apr 72, p. 11.
E164	Convair 600 (Texas Intl)	16 Feb 72	0	S	Beaumont, Tex. USA. Low pressure impeller (right engine). Ref: NTSB file 1-0014.
E165	Douglas DC-9 (Delta)	19 Mar 72	0	S	Atlanta, Ga. USA. Second stage compressor disc (# 2 engine). Separated at rear fan case. NTSB file 1-0011.
E166	Saab-Scania S32C Lansen (Swedish AF)	12 Apr 72	0	D	Ostersund, Sweden. Fuel pipe. Ref: Swedish AF
E167	Cessna 120	19 Apr 72	0	S	Watervliet, Mich. USA. Carburetor butterfly valve. NTSB file 3-1555.
E168	Cessna 411	30 Apr 72	0	S	Monticello, Miss. USA. # 1 & 2 cylinder exhaust valves (right engine). Ref: NTSB file 3-2270.
E169	Cessna 210B	25 May 72	0	S	Wappapello, Mo. USA. # 1 cylinder cracked. Ref: NTSB file 3-1898.
E170	Dassault Mirage III (RAAF)	17 Jul 72	0	D	Butterworth, Malaysia. 7th stage compressor rotor ring. Manufacturing defect. Elongation of rivet holes. Ref: RAAF
E171	Beech V35 Bonanza	19 Jul 72	0	S	Oneill, Neb. USA. Alum nipple broke at turbocharger attaching point. Ref: NTSB file 3-2601.
E172	Aero Commander 680E	9 Aug 72	0	S	Cambridge, Ohio. USA. Crankshaft (3rd order counterweight ears). Ref: NTSB file 3-3270.

E173	Grumman OV-1D Mohawk (US Army)	12 Aug 72	1	D	Vn. USA. Engine (disc). Ref: US Army.
E174	Fletcher FU24	14 Sep 72	0	S	Ngaroma, New Zealand. Camshaft gear. Ref: NZ brief 72-082
E175	Snow S-2D	18 Sep 72	0	S	Ngakuru, New Zealand. Master rod piston pin bore. Ref: NZ brief 72-084.
E176	Snow Commander S2D	25 Sep 72	0	S	Windsor, Jamaica. No. 1 cylinder connecting rod. Ref: Jamaica.
E177	Fokker F-27 (ATI)	15 Oct 72	0	S	Rome, Italy. Low pressure impeller. Ref: WAAS p. 31/72.
E178	de Havilland Comet 4C (Egyptair)	3 Nov 72	0	S	Benina, Libya. No. 2 engine, H.P. turbine disk at rim. Ref: WAAS
E179	Cessna 172B	11 Nov 72	0	S	Marton, New Zealand. No. 5 cylinder at base, in region of nos. 1 & 3 cooling fins. Ref: NZ brief 72-106.
E180	Cessna A188	7 Dec 72	0	S	Ashley Gorge, New Zealand. No. 4 connecting rod. 4363 hours. Ref: NZ brief 72-119.
E181	Piper PA 25-235 Pawnee	1973	0	S	Trentham Vic., Australia. Part impulse coupling cam fell between crankshaft idler gear. Ref: Australia DoT.
E182	Piper PA 28-140 Cherokee	1973	0	S	Moorabbin Vic., Australia. No. 2 connecting rod. Ref: Australia DoT.
E183	Beech M35 Bonanza	1973	0	S	Morwell Vic. Australia. Crankshaft (by no. 2 connecting rod journal). Ref: Australia DoT.
E184	Beech P35 Bonanza	1973	0	S	Mansfield Vic., Australia. Connecting rod bearing. Ref: Australia DoT
E185	Saab-Scania J35F Draken (Swedish AF)	10 Jan 73	0	D	Vasteras, Sweden. Compressor blade. Ref: Swedish AF
E186	Boeing 707 (American)	20 Jan 73	0	S	Elk Grove Village, Ill. USA. 3rd stage nozzle vane retaining lugs, no. 4 engine (fretting). Ref: NTSB file 1-0001.
E187	Stinson 108-1	23 Jan 73	0	S	Fort Pierce, Fla. USA. No. 1 cylinder (at base). NTSB file 3-0294.
E188	Aero Commander A-9B	19 Feb 73	0	S	Sunnymead, Cal. USA. Crankshaft. Ref: NTSB file 3-1521.

E189	Cessna U206	7 Mar 73	0	D	Kihei, Hawaii, USA. Crankshaft at no. 2 journal. NTSB file 3-0991.
E190	Grumman G-164 AgCat	30 Mar 73	0	S	Knights Landing, Cal. USA. No. 9 cylinder. Ref: NTSB file 3-0745.
E191	Beech A23 Musketeer	8 Apr 73	0	S	Eden Prairie, Minn. USA. Dowel pin, all starter gear and crankshaft gear attach bolts broken. Ref: NTSB file 3-1195.
E192	Grumman G-164 AgCat	2 Jun 73	0	S	Church Point, La. USA. Crankshaft. Ref: NTSB file 3-1274.
E193	Piper PA-25 Pawnee	22 Jun 73	0	S	Gettysburg, S. Dak. USA. Crankshaft. Ref: NTSB file 3-2063.
E194	Snow S2C	30 Jun 73	0	S	Pearsall, Tex. USA. Crevice corrosion found on no. 7 piston pin. Fatigue fracture. Ref: NTSB file 3-3193.
E195	Globe GC-1B	28 Jul 73	0	D	Ballston Spa, N.Y. USA. Fuel line to carburettor. Ref: NTSB file 3-2309
E196	Canadair CL-84 Dynavert	8 Aug 73	0	D	Patuxtent, Md. USA. Gear broke in prop gearbox. 122.7 hours on part
E197	Piper PA-28-180 Cherokee	19 Aug 73	0	D	Helsinki, Finland. Forward end bearing of crankshaft broke (fatigue), due to an inside corrosion. Ref: Finland BoA.
E198	S.A.N. Jodel D.117	3 Sep 73	3	D	Brixham, U.K. No. 2 cylinder at head attachment thread. Ref: UK CAA rept 21/74
E199	Bellanca 14-19	7 Sep 73	0	S	Hammondsport, N.Y. USA. No. 3 piston oil wiper ring, fractured at heel. Ref: NTSB file 3-3814.
E200	Saab-Scania AJ37 Viggen (Swedish AF)	9 Oct 73	0	D	Linkoping, Sweden. Compressor disc. Ref: Swedish AF
E201	Cessna 310C	21 Nov 73	0	D	Montrose, Colo. USA. No. 1 cylinder barrel of engine separated. Ref: NTSB file 3-4149.
E202	C.A.C. Austrl. CA-28C Ceres	1974	0	S	Glen Innes, NSW, Australia. Cylinder assembly. Ref: Australia DoT.
E203	Fokker F-27 (Sudan Airways)	6 Mar 74	0	S	Khartoum, Sudan. Rear hub face of impeller (fretting), no. 2 engine. Ref: WAAS p.8/74.

E204	Piper PA-22	8 Mar 74	0	S	Compton, Cal. USA. Piston of no. 3 cylinder. NTSB file 3-0415.
E205	Piper PA-24 Commanche	14 Mar 74	0	S	Highland Beach, Fla. USA. No. 2 conrod. Ref: NTSB file 3-0301.
E206	CallAir A-9B	14 Mar 74	0	S	Calexico, Cal. USA. No. 5 connecting rod. Ref: NTSB file 3-0740.
E207	Stinson 108-1	17 Mar 74	0	S	Tekoa, Wash. USA. Muffler fatigue fracture. NTSB file 3-1054.
E208	Stearman A75	29 Mar 74	0	S	Pixley, Cal. USA. Crankshaft. Ref: NTSB file 3-0738.
E209	Dassault Mirage III (RAAF)	1 Apr 74	0	D	Butterworth, Malaysia. Compressor first stage blade (manufacturing defect). Ref: Royal Australian Air Force.
E210	Piper PA-32 Cherokee SIX	4 Jun 74	0	S	Friendship, Wis. USA. Oil filter center stud. NTSB file 3-4321.
E211	American AA-5	16 Jun 74	0	S	Chula Vista, Cal. USA. Carb heat control cable. NTSB file 3-1662.
E212	Beech P35	30 Jun 74	0	D	Tutelake, Calif. USA. No. 1 conrod bolt. Ref: NTSB file 3-1747.
E213	Cessna 150	31 Jul 74	0	S	Cobble Hill, BC, Canada. No. 1 cylinder exhaust valve. Ref: MoT Canada file P40065.
E214	Piper PA-36 Pawnee Brave	2 Aug 74	0	S	Winnemucca, Nev. USA. Crankshaft. Ref: NTSB file 3-2569.
E215	Vollmer Sportsman	3 Aug 74	0	S	Webster, Wis. USA. No. 1 and 3 exhaust stacks. Ref: NTSB file 3-3468
E216	Aero Commander 600S-2R	17 Aug 74	0	S	Lake Providence, La. USA. Exhaust side of no. 4 cylinder head. NTSB file 3-2567.
E217	Aero Commander S-2R	3 Sep 74	0	D	Kuopio, Finland. Connecting rod. Ref: Finland BoA.
E218	Reims Avion F 172H	15 Sep 74	0	D	Letmathe-Loessel, W. Germany. Connecting rod. Ref: W. German file 3X0412.
E219	Piper PA-30 Twin Commanche	2 Oct 74	0	S	Leavenworth, Kans. USA. Crankshaft. Ref: NTSB file 3-3432.
E220	Beech B24R	5 Oct 74	0	S	Wallkill, N.Y. USA. No. 3 conrod. Ref: NTSB file 3-3725.

E221	Piper PA-32 Cherokee SIX	23 Oct 74	1	D	Huntsville, Texas USA. No. 3 cylinder separated. Hold-down studs under-torqued, through bolts failed. Ref: NTSB file 3-4329
E222	Beech H35 Bonanza	1 Dec 74	3	D	Hayward, Calif. USA. Crankshaft. Wrong propeller installed. Ref: NTSB file 3-4312
E223	Cessna 377	6 Dec 74	0	S	Cabonga Reservoir, Que. Canada. Crankcase. Ref: MoT Canada file Q40120.
E224	Beech V35 Bonanza	20 Dec 74	0	S	St. Paul, Minn. USA. No. 5 connecting rod bolts. Ref: NTSB file 3-4167
E225	Hawker Siddley HS 748 (PAL)	3 Feb 75	33	D	Manila, Philippines. 3 bridges in flame tube of no. 5 combustion chamber failed, causing fire. Ref: WAAS p 4/75
E226	Cessna U206	15 Mar 75	0	S	Kenai, Alas. USA. Crankshaft. Ref: NTSB file 3-1101.
E227	Cessna T337	18 Mar 75	0	S	Dubois, Id. USA. Line to fuel flow gauge. NTSB file 3-4139.
E228	Piaggio P.149-D1	13 Apr 75	0	S	Neuenwalde, W. Germany. Crankshaft. Vibration due to wear of bearings. Ref: W. German file 3X0054.
E229	Republic RC-3 Seabee	13 Apr 75	2	D	Markham, Ont. Canada. No. 6 cylinder. Ref: MoT Canada file 050025.
E230	McDonnell CF-101 Voodoo (Canadian Forces)	14 May 75	0	D	Bagotville, Que. Canada. Starboard engine caught fire during afterburner. Crack adjacent to axial weld of engine casing. Ref: CFAIRS.
E231	Cessna 172L	3 Jun 75	0	S	Mt. Sterling, Ill. USA. Stepped dowel pin. NTSB file 3-3457.
E232	Saab-Scania S35E Draken (Swedish AF)	5 Jun 75	0	D	Lulea, Sweden. Compressor blade. Ref: Swedish AF
E233	Cessna 402A	15 Jun 75	0	S	Seattle, Wash. USA. Exhaust manifold, right engine. NTSB file 3-1938.
E234	Piper PA-22	18 Jun 75	0	S	Wyoming, Ont. Canada. No. 3 exhaust valve. MoT Canada file 050053.
E235	Cessna 206B	23 Jun 75	0	S	Imperial, Cal. USA. No. 3 cylinder conrod bolts. NTSB file 3-1479.

E236	de Havilland DHC-3 Otter	25 Jun 75	0	S	Unnamed lake, Que., Canada. Crack in valve rocker arm housing resulted in valve failure. Ref: MoT Canada file Q50062
E237	Beech E18S	26 Jun 75	2	D	Toledo Ohio, USA. Fatigue - cylinder head. Unapproved mod. Standpipe cut off flush with bottom of oil tank. Ref: NTSB file 3-2514
E238	Cessna 182B	30 Jun 75	0	S	Wachenheim, West Germany. Crankshaft. Ref: W. German file 3X0244.
E239	Douglas Dakota (RAAF)	9 Jul 75	0	S	Sale, Vic., Australia. R.h. engine, fracture of rear master connecting rod cap. Ref: Royal Australian Air Force.
E240	Cessna 210	4 Aug 75	1	S	Hope, BC, Canada. Connecting rod. Ref: MoT Canada file P50047.
E241	Snow Commander S2D	15 Aug 75	0	S	Riversdale, Jamaica. Master connecting rod. Ref: Jamaica.
E242	Cessna 150F	16 Aug 75	0	S	Jean, Nev. USA. Mixture control wire came loose at carburetor. Ref: NTSB file 3-1154.
E243	Cessna 175	17 Aug 75	0	S	Kenora, Ont. Canada. No. 5 cylinder. Ref: MoT Canada file C50117.
E244	Saab-Scania Viggen (test aircraft)	27 Aug 75	0	D	Karlsborg, Sweden. Compressor blade. Ref: Swedish AF
E245	Piper PA-25 Pawnee	6 Sep 75	0	S	Tahoka, Tex. USA. Crankshaft. Ref: NTSB file 3-3809.
E246	Saab-Scania A32A Lansen (Swedish AF)	9 Sep 75	0	D	Strangnas, Sweden. Turbine disc. Ref: Swedish AF
E247	Boeing 727-200 (ANA)	17 Sep 75	0	S	Tokyo, Japan. Welding parts (Ps4) of combustion chamber outer case. Origin: pitting corrosion. Ref: Japan MoT
E248	Saab-Scania A32A Lansen (Swedish AF)	17 Nov 75	0	S	Vanersborg, Sweden. Compressor disc. Ref: Swedish AF.
E249	Cessna 207	1976	0	S	Groote Eylandt, NT., Australia. Muffler baffles separated from rods. Ref: Australia DoT.
E250	Cessna 421B	1976	0	S	Norseman, WA, Australia. Broken weld joint on right-hand exhaust slip joint assembly. Ref: Australia DoT.

E251	Beech 36 Bonanza	1976	1	D	Australia. Engine crankcase adjacent to cylinder attachment stud holes. Ref: Australia DoT
E252	de Havilland 82	1976	0	S	Taree NSW, Australia. Rocker bracket bolts, no 4 cylinder. Ref: Australia DoT.
E253	Piper PA-24 Commanche	7 Jan 76	0	S	Santee, Cal. USA. Crankshaft dowel pin. Ref: NTSB file 3-0153.
E254	Cessna 210	11 Jan 76	0	S	Carpenteria, Cal. USA. Crankshaft. Ref: NTSB file 3-2550.
E255	Piper PA-32 Cherokee SIX	12 Jan 76	0	S	Big Spring, Tex. USA. Crankshaft. Ref: NTSB file 3-1487.
E256	Beech V35 Bonanza	31 Jan 76	0	S	Kings Park, N.Y. USA. Crankshaft. Ref: NTSB file 3-2884.
E257	Centre Est DR 400	29 Feb 76	0	D	Gelnhausen, W. Germany. Fatigue failure of non-approved muffler. Ref: W. German file 3X0027.
E258	Stinson 108-1	24 Apr 76	1	D	Aglasterhausen, West Germany. Crankshaft. Ref: West German file 3X0155.
E259	Cessna 185 Skywagon	29 Apr 76	0	S	Whonnock Lake, B.C. Canada. Crankshaft. Ref: MoT Canada file P60017.
E260	Northrup CF-5 (Canadian Forces)	2 May 76	0	D	Winnipeg, Man. Canada. #1 afterburner spray bar cracked. Torching burned through heat shield causing fire. Ref: CFAIRS.
E261	Aero Commander 600S-2R	6 May 76	0	S	Hermiston, Ore. USA. Impeller shaft. Ref: NTSB file 3-2215.
E262	Cessna 210C Centurion	7 May 76	1	D	Florence, Oregon, USA. Crankshaft failure. Main bearing misaligned - wrong con rod bearings. NTSB file 3-1614
E263	Beech 95-B55 Baron	29 May 76	4	D	Holly Springs, Miss. USA Camshaft gear teeth failed, crack in undersized radii at gear teeth roots. Ref: NTSB file 3-4073
E264	de Havilland DHC-2 Mk I Beaver	2 Jul 76	0	S	The Martin Hills, NWT. Canada. Unapproved hard brass fitting on fuel line inlet to carburetor. Ref: MoT Canada file W60056.
E265	Beech 65 Queen Air	27 Jul 76	0	S	Bedford, Ma. USA. Crankshaft (#3 counter wt hanger). Ref: NTSB file 3-2363.

E266	Beech 58 Baron	3 Aug 76	6	D	Chillicothe, Mo. USA. Crankshaft at no. 7 crankcheek. Ref: NTSB file 3-3539
E267	Piper PA-28-140 Cherokee	10 Aug 76	2	?	Helsinki, Finland. Exhaust valve. Ref: Finland.
E268	Cessna 210	16 Aug 76	0	S	Ellgau, W. Germany. Connecting rod bearing due to bushing wear. Ref: W. German file 3X0417.
E269	Aero Commander 112A	21 Aug 76	0	D	Santa Ana, Calif. USA. Throttle-power lever assembly. NTSB file 3-3077
E270	Cessna 185E	28 Aug 76	0	S	Wainwright, Alas. USA. Throttle-power lever assemblies, support shaft for bellcranks failed. Ref: NTSB file 3-3933.
E271	Reims Avion F-150L	7 Sep 76	0	S	Tuensdorf, West Germany. Connecting-rod bearing damaged as a result of loss of oil through a broken dump valve. Ref: West German file 3X0469.
E272	Aerospatiale Caravelle (Indian Airlines)	12 Oct 76	95	D	Bombay, India. Disintegration of 10th compressor stage of Rolls Royce Avon engine. Ref: FI 21 Oct. 78 p. 1459.
E273	Cessna 210B Centurion	21 Oct 76	1	S	Granbury, Texas USA. Hold-down studs of no. 5 cylinder (undertorquing). Ref: NTSB file 3-4161
E274	Bellanca 17-30A	24 Oct 76	2	D	Nakina, N.C. USA. Muffler-assembly ball joint cracked in weld area, causing burned ignition leads & engine failure. Ref: NTSB file 3-3401
E275	Piaggio P.166	1977	1	?	Australia. Engine connecting rod. Ref: Australian DoT
E276	Cessna U206F	26 Feb 77	1	S	Clarks Junction, New Zealand. Cracked tooth in camshaft cluster gear. Ref: NZ AAR 77-037
E277	Piper PA-36 Pawnee Brave	20 Apr 77	0	S	Brawley, Cal. USA. No. 4 exhaust valve (thermal fatigue). Ref: NTSB file 3-2658.
E278	Piper PA-28 Cherokee	12 May 77	0	S	Iowa City, Iowa. USA. Engine cylinder assembly. Ref: NTSB file 3-1097.
E279	Piper PA-34 Seneca	26 May 77	1	D	Bridgeport, WV USA. Crankshaft at no. 3 main bearing journal. Ref: NTSB file 3-1764

E280	Globe GC-1A	5 Jun 77	1	S	Erding, West Germany. Rocker arm for exhaust valve. Ref: W. German file 3X0172.
E281	Boeing A75-N1 Stearman	11 Jun 77	0	S	Sulphur, La. USA. No. 2 link rod of piston. Ref: NTSB file 3-1111.
E282	Cessna 210K	11 Jun 77	0	S	Manor, Tex. USA. Crankshaft. Ref: NTSB file 3-1581.
E283	Cessna 210 Centurion	23 Jun 77	1	D	Summerland Key, Florida USA. Propeller cylinder separated, oil on windshield restricted vision. Ref: NTSB file 3-4044
E284	Auster 5J1	2 Jul 77	0	S	Dorsten-Wulfen, W. Germany. Crankshaft. Ref: W. German file CX0013.
E285	Beech 35 Bonanza	13 Jul 77	0	S	Clinton, Iowa. USA. Two supporting base studs of #2 cylinder. Ref: NTSB file 3-1633.
E286	Cessna 172	11 Aug 77	0	S	Pelican Lake, B.C. Canada. Fractured oil line. Ref: MoT Canada file P70062.
E287	Beech 65-80 Queen Air	13 Aug 77	3	D	Vancleave, Miss. USA. Crankshaft (crack at #5 connecting rod throw). Ref: NTSB file 3-4189
E288	Piper PA-28R Cherokee	20 Aug 77	0	S	Los Angeles, Cal. USA. Conrod bolts. Ref: NTSB file 3-3503.
E289	Beech P35 Bonanza	21 Aug 77	1	D	Pittsburgh, Penn. USA. Crankshaft (crack in area where bearing rotated). Ref: NTSB file 3-4172
E290	Beech E18S	22 Aug 77	2	D	Catalina Island, Calif. USA. Cracks in combustion heater allowed fumes into cockpit. Ref: NTSB file 3-3452
E291	Cessna 180 Skywagon	28 Aug 77	0	S	High Level, Alta. Canada. Camshaft gear teeth (rough machining). Ref: MoT Canada file W70093.
E292	Moravan Z526	2 Sep 77	0	S	Schmidgaden, W. Germany. Intake valve, #2 cylinder. Ref: W. German file 3X0469.
E293	Piper PA-32 Cherokee SIX	9 Sep 77	0	S	Verden-Sch., W. Germany. Locking bolt on DC generator/alternator. Ref: W. German file 3X0532.
E294	Saab-Scania AJ37 Viggen (Swedish AF)	22 Sep 77	0	D	Lidkoping, Sweden. Failure of ball retainer in drive-shaft ball-bearing. Ref: Swedish AF.

E295	Cessna 402B	29 Sep 77	2	D	Mercer, Penn. USA. Crack in manifold couple permitted exhaust gas into wing, causing fire. Ref: NTSB file 3-4157
E296	Curtiss C-46	29 Sep 77	0	S	Thompson, Man. Canada. Low oil pressure due to small piece of failed piston skirt which became wedged under oil pressure relief valve. MoT Canada file C70136.
E297	Cessna A185E	30 Oct 77	0	S	80 mi. SE Cornerbrook, Nfld. Canada. Air valve shaft in air intake box. Fastener hole drilled oversize and off-centre. Ref: MoT Canada file A70036.
E298	Saab-Scania J35F Draken (Swedish AF)	23 Nov 77	0	D	Angelholm, Sweden. Turbine disc. Ref: Swedish AF
E299	Cessna T210L	23 Dec 77	0	S	Moriarty, N.M. USA. Crankshaft. Ref: NTSB file 3-4074.
E300	Cessna 182M	1978	0	S	Wangaratta Vict., Australia. No. 5 piston disintegrated. Ref: Australia DoT.
E301	N. American P-51 Mustang	15 Feb 78	0	S	Ellisville, Ms. USA. Crankshaft at no. 4 webbing. NTSB file 3-0721.
E302	Grumman G-164 AgCat	11 May 78	0	S	Elton, La. USA. Engine cylinder assembly. Ref: NTSB file 3-1165.
E303	Cessna 210-5	20 May 78	0	D	Phoenix, Ariz. USA. Crankshaft. Ref: NTSB file 3-3668.
E304	Cessna 172A	4 Jun 78	0	S	Trail, B.C. Canada. # 2 cylinder 1" below top of barrel. Origin: rough machining. Ref: MoT Canada file P80043
E305	Cessna 172	9 Jun 78	0	S	La Conception, Que. Canada. #3 exhaust valve assembly. MoT Canada file Q80038.
E306	Cessna 185 Skywagon	14 Jun 78	0	S	Chilliwack, B.C. Canada. Induction airbox shaft, providing pivot on throttle bellcrank. Ref: MoT Canada file P80047.
E307	Beech 18	19 Jun 78	0	D	Windsor Locks, Ct. USA. No. 2 bearing of no. 1 engine failed. No. 2 power turbine blade failed. NTSB file 3-2328
E308	Piper PA-32 Cherokee SIX	23 Jun 78	0	S	Goshen, Ind. USA. # 4 cylinder. Ref: NTSB file 3-3990.
E309	Dornier DO 27B-1	27 Jun 78	0	D	Varberg, W. Germany. Exhaust valve of cylinder #2. Ref: W. German file 4X0031.

E310	Saab-Scania J35F Draken (Swedish AF)	30 Jun 78	0	D	Vasteras, Sweden. Turbine disc. Ref: Swedish AF.
E311	Beech M-35 Bonanza	2 Jul 78	0	S	Riveredge, Ohio. USA. Fuel injection system fracture. Flow divider diaphragm and shaft cup seal aged. Ref: NTSB file 3-1843.
E312	Piper PA-28 Cherokee	16 Jul 78	0	S	Saitama Pref., Japan. #2 cylinder exhaust push rod. Ref: Japan.
E313	Piper PA-28 Cherokee Cruiser	19 Jul 78	0	S	Causapscal, Que. Canada. #3 cylinder. Aircraft had flown only 17 hours in 12 years. Ref: MoT Canada file Q80056.
E314	Centre Est DR 253	29 Jul 78	0	S	Leer-Nuettermoor, W. Germany. Exhaust valve. Ref: W. German file 3X0304.
E3 5	Dyke JD-1 Delta	5 Aug 78	0	S	Fort Bridger, Wy. USA. Exhaust muffler broke loose from fatigue. Ref: NTSB file 3-2688.
E316	Grumman G-21A Goose	2 Sep 78	4	D	St. Thomas, Virgin Islands. Cylinder assembly. Ref: NTSB file 3-3128.
E317	Cessna 182Q	7 Sep 78	0	S	San Antonio, Tex. USA. Carb heat control cable improperly rigged, bent, failed. Ref: NTSB file 3-2860.
E318	Cessna 402B	7 Sep 78	0	D	Hyder, Arizona USA. Fracture of exhaust system from excessive vibration. Bolt connecting ball joint on right side of left engine missing. Ref: NTSB file 3-4362.
E319	Cessna 150L	17 Sep 78	0	S	Strathlorne, N.S. Canada. #4 connecting rod cap (outer corners of oil scavenge hole). Ref: MoT Canada file A80031.
E320	Grumman American AA-5	4 Oct 78	2	D	Littleton, Colo. USA. No. 3 cylinder at folds between barrel fins. Ref: NTSB file 3-4417
E321	Beech 36 Bonanza	10 Nov 78	0	S	Unalakleet, Alas. USA. Crankshaft. Ref: NTSB file 3-4310.
E322	Socata 893A Rallye Commodore	19 Nov 78	0	S	Duena, W. Germany. Broken oil line of engine. Ref: W. German file 3X0477.
E323	Aero Commander 680	28 Dec 78	1	D	Oklahoma City, Okla. USA. Conrod in left engine. NTSB file 3-4415.

E324	Cessna U206	1979	0	S	Mt. Isa Qld., Australia. No. 6 cylinder separated (crack in flange). Loose hold-down nut. Ref: Australia DoT.
E325	Beech A24 Musketeer	1979	0	S	Marulan NSW, Australia. Piston pin (faulty manufacture). Ref: Australia
E326	Beech 58P Baron	29 Jan 79	0	S	Amarillo, Tex. USA. Crankshaft. Ref: NTSB file 3-0582.
E327	Beech 58 Baron	5 Feb 79	0	S	Kalgoorlie WA, Australia. No. 3 cylinder inlet valve. Ref: Australia DoT.
E328	Saab-Scania J35F Draken (Swedish AF)	6 Feb 79	0	D	Vastervik, Sweden. Turbine screw. Ref: Swedish AF.
E329	Cessna 150	27 Feb 79	0	S	Anchorage, Alas. USA. Head of # 3 cylinder. Ref: NTSB file 3-0986.
E330	Cessna 172	15 Mar 79	0	S	Cedar Key Airport, Fla. USA. # 3 cylinder barrel (corrosion pits). Ref: MoT Canada file F90014.
E331	Fokker F-27 (Quebecair)	29 Mar 79	17	D	Quebec City, Que. Canada. Engine failure from crack in engine compressor, low-pressure impellor, Ref: ICAO ADREP 2015/79
E332	Stinson 108-2	14 Apr 79	0	S	Sidney, Mont. USA. # 1 cylinder at base. NTSB file 3-0469.
E333	Cessna 210 Centurion	17 Apr 79	6	D	Cable, Wi. USA. No. 3 exhaust valve. NTSB file 3-3959
E334	Piper PA-22	25 Apr 79	0	S	King City, Cal. USA. No. 2 conrod. Ref: NTSB file 3-1789.
E335	Cessna 150	27 May 79	0	S	Turku, Finland. Engine cylinder. Ref: Finland BoA.
E336	Mooney M-20E	4 Jun 79	0	S	Idar-Oberstein, W. Germany. Stud of #3 cylinder. Ref: W. German file 3X0171
E337	Grumman TBM-3E Avenger	15 Jun 79	0	D	Sevogle, NB, Canada. Carburettor hot air door in air intake duct broke off and blocked carb intake. Origin: bolt holes. Ref: MoT Canada file 79-A00018.
E338	de Havilland DHC-2 Beaver	25 Jul 79	0	D	Yarrowitch NSW, Australia. Cracked cylinder head. Ref: Australia DoT.
E339	Piper PA 18-150 Super Cub	23 Aug 79	0	S	Schwatka Lake, Y.T. Canada. Rear section of valve in carb heat box. Ref: MoT Canada file W90078.

E340	Cessna 172K	30 Aug 79	0	S	Hopewell, Va. USA. Crankshaft. Ref: NTSB file 3-3446.
E341	Saab-Scania S35E Draken (Swedish AF)	30 Aug 79	0	D	Katrineholm, Sweden. Turbine disc. Ref: Swedish AF.
E342	Cessna 207	8 Sep 79	0	S	Umiat, Ak. USA. Crankshaft at no. 2 journal. NTSB file 3-3616.
E343	Beech A36 Bonanza	10 Sep 79	0	S	Cincinnati, Ohio. USA. Crankshaft. Ref: NTSB file 3-3222.
E344	Beech N35 Bonanza	11 Sep 79	1	D	Olean, N.Y. USA. Crankshaft failed at crack 80% thru long crankcheek between no. 1 & no. 2 crank pins. Ref: NTSB file 3-3667
E345	Beech 36 Bonanza	21 Sep 79	0	S	Bassett, Ne. USA. Crankshaft. Ref: NTSB file 3-2883.
E346	Ted Smith Aerostar 601P	16 Nov 79	3	D	Charlstadt, N.J. USA. Exhaust pipe assembly at flange weld. Ref: NTSB file 3-3966.
E347	Cessna 210	19 Nov 79	0	S	Beckwourth, Cal. USA. Crankshaft at no. 5 and 6 cylinder journals. Ref: NTSB file 3-3880.
E348	Ryan PT-22	5 Feb 80	0	S	Oakland, Ca. USA. Crankshaft. Ref: NTSB file 3-1409.
E349	Cessna 172	6 Feb 80	0	S	Bruce, Wi. USA. Oil pump drive gear shaft. NTSB file 3-0368.
E350	Piper PA-28R Cherokee	12 Feb 80	0	S	Sherman, Il. USA. Crankshaft. Ref: NTSB file 3-0064.
E351	Cessna 182	16 Feb 80	0	S	Wandering River, Alta. Canada. Rocker arm support boss (overtorqued locking bolt). Ref: MoT Canada file W00014.
E352	Piper PA-31T Cheyenne	12 Mar 80	0	S	Kettleman City, Ca. USA. 2 compressor turbine vanes eroded and 3 blades fractured. Ref: NTSB file 3-2582.
E353	Ilyushin IL-62 (LOT Polish Airlines)	14 Mar 80	87	D	Warsaw, Poland. Failure of shaft of no. 2 engine, damaging 2 other engines & control system for tail surfaces. Ref: ICAO ADREP 22/80.
E354	General Dynamics F-16 (USAF)	26 Mar 80	0	D	Hill AFB, Utah USA. 9th stage compressor disk on P&W F100 engine. Ref: AWST 2 June 80, p. 65.

E355	Grumman G-164B AgCat	19 Apr 80	0	D	Billings, Mont. USA. Mixture push-pull rod fractured at thread. Ref: NTSB file 3-0649.
E356	Grumman G-164 AgCat	26 Apr 80	0	S	Palermo, Ca. USA. No. 1 cylinder head. Ref: NTSB file 3-1479.
E357	Piper PA-28 Cherokee Cruiser	9 May 80	3	D	Desboro, Ont. Canada No. 3 cylinder, fracture of all 8 cylinder studs (improper torquing of studs). Ref: MoT Canada file 80-000903
E358	Steen Skybolt I	22 May 80	0	S	Brantford, Ont. Canada. Connecting rod bolt. Induced by over-speeding attributed to conversion of approved constant speed prop to fixed pitch. Ref: MoT Canada file 000027.
E359	Stinson 108 Voyager	9 Jun 80	0	S	Rockland, Ont. Canada. Crankshaft aft of front main bearing. Origin: grinding crack. Ref: MoT Canada file 000904.
E360	Cessna 185	17 Jun 80	0	S	Iliamna,Ak. USA. Mixture-control valve shaft on induction system airbox. Ref: NTSB file 3-1680.
E361	Cessna P210	10 Jul 80	1	D	Marcellus, Mi. USA. Cylinder separated after fatigue of under-torqued thru-bolts & hold-down studs. Ref: NTSB file 3-3721
E362	Grumman G-164 AgCat	30 Jul 80	0	S	Samson, Al. USA. Crankshaft, front counterweight assembly. Ref: NTSB file 3-1829.
E363	de Havilland DHC-2 Mk I Beaver	7 Aug 80	0	S	Bartlett's Pond, Nfld. Canada. No. 2 cylinder head separated from barrel. Ref: MoT Canada file A00022.
E364	Piper PA-20 Pacer	18 Aug 80	0	S	East Gore, N.S. Canada. Oil line fitting in oil cooler (corrosion pits in thread roots). Ref: MoT Canada file A00025.
E365	Piper PA-18 Super Cub	22 Aug 80	1	S	Exeter, R.I. USA. No. 3 exhaust valve. Ref: NTSB file 3-1743.
E366	Cessna 150	5 Sep 80	0	S	Wellandport, Ont. Canada. No. 3 cylinder rocker shaft support. Ref: MoT Canada file 000085.
E367	McDonnell Douglas TF/A-18 Hornet (US Navy)	8 Sep 80	0	D	Middle Wallop, England. Low-pressure turbine disk of right engine. Crack began at large flaw. Material: Rene 95. Ref: FI 3 Jan 81 p 29.

E368	De Havilland DHC-2 Mk.1 Beaver	10 Sep 80	3	D	Whitehorse, Yukon Canada. No. 3 piston pin. Origin: corrosion pitting. Ref: MoT Canada file 80-W00099.
E369	Stampe SV-4B	10 Oct 80	0	D	Baragwanath, Republic of South Africa. Crankshaft failed just behind thrust bearing. Ref: South Africa DoT.
E370	H.S. Harrier GR.3 (RAF)	28 Oct 80	0	D	Kaleborn, W. Germany FOD damage to fan, fatigue cracks propagated from impact mark, h.p. compressor blade failed. Ref: FI 28 Nov. 81, p 1612.
E371	Piper PA-38 Tomahawk 2	17 Nov 80	2	D	Santa Rosa, Calif. USA. Pushrod of #4 intake valve flared. Thermal fatigue of valve. Ref: NTSB file 3-3738.
E372	Piper PA-24 Commanche	30 Nov 80	1	D	Annawan, Ill. USA. Crankshaft counterweight assembly at machining groove. Ref: NTSB file 3-3241.
E373	Beech 55 Baron	10 Dec 80	0	S	Edmonton, Alta. Canada. No. 6 cylinder - piston con rod through I-beam section. Fatigue initiated as a result of rod having been bent by hydraulic lock. Ref: MoT Canada file W00071.
E374	Cessna P206	1981	0	D	Kilcoy, Queensland Australia. #4 cylinder exhaust valve. Ref: Australia DoT.
E375	Commonwealth CA-28 Ceres	1981	0	S	Glenreagh NSW, Australia. No. 3 cylinder exhaust rocker arm cover. Ref: Australia DoT.
E376	Beech F33A Bonanza	3 Jan 81	0	S	St. Paul, Mn. USA. Poor quality control. No radius on fillet of camshaft where undercut for oil holes. Also undercut 0.005". Ref: NTSB file 3-0033.
E377	Piper PA-24 Commanche	10 Jan 81	0	S	Olympia, Wa. USA. Crankshaft. During re-nitriding, temps exceeded allowable, lowering core hardness. Ref: NTSB file 3-2730.
E378	Cessna U206F	12 Jan 81	0	S	Sherburne, Mn. USA. Crankshaft no. 2 main journal. NTSB file 3-0191
E379	Saab-Scania AJ37 Viggen (Swedish AF)	10 Feb 81	0	D	Karlsborg, Sweden. Shaft failure in engine gear-box due to ball-bearing failure. Ref: Swedish AF.
E380	Cessna 150M	18 Feb 81	0	S	Eudora, Ks. USA. No. 4 cylinder at 5th cooling fin from mounting flange. Ref: NTSB file 3-0761.

E381	Cessna 210N	22 Feb 81	0	S	Miyagi Pref., Japan. Piston pin. Ref: Japan MoT.
E382	SIAI-Marchetti SF.260M (Belgian AF)	13 Mar 81	0	D	Renaix, Belgium. Failure of crankshaft lug due to bad installation of counterweight rollers. Ref: Belgium AA.
E383	Cessna 180	14 Mar 81	0	S	Shishmaref, Ak. USA. No. 5 cylinder failed in threaded area near cylinder head. Ref: NTSB file 3-0412.
E384	Mooney M-20G	21 Mar 81	2	D	Ryegate, Mt. USA. Mufflers, poor weld, corrosion and fatigue fracture. Ref: NTSB file 3-1456.
E385	Beech A23-24	31 Mar 81	0	S	Sawyer, Ky. USA. No. 4 cylinder wall. Ref: NTSB file 3-1474.
E386	Stinson 108-1	13 Apr 81	0	D	Manahawkin, NJ, USA. Crankshaft. Ref: NTSB file 3-2889.
E387	Mooney M-20K	3 May 81	0	S	Churchville, Md. USA. No. 5 piston (voids). NTSB file 3-2081.
E388	Piper PA-28 Cherokee Cruiser	5 Jun 81	0	S	Stony Rapids, Sask. Canada. Exhaust valve at stem-to-head fillet. Origin: corrosion pits. Ref: MoT Canada file C10045.
E389	Piper PA-31P Pressurised Navajo	8 Jun 81	0	S	Dallas, Tx. USA. Left engine lower tailpipe bracket failed. No inspection as per AD. Ref: NTSB file 3-1988.
E390	Cessna 150	5 Jul 81	0	S	Georgetown, Ca. USA. Mixture control bracket (outside the weld on exhaust cross-over brace). Ref: NTSB file 3-1791
E391	Cessna 180 Skywagon	11 Jul 81	0	D	Lake Margane, Que. Canada. Crankshaft. Ref: MoT Canada file Q10066.
E392	Piper PA-28 Cherokee	19 Jul 81	1	D	Buckland, NC. USA. No. 3 cylinder exhaust valve (worn guide). Ref: NTSB file 3-3090.
E393	N. American S-21 Thrush Commander	23 Jul 81	0	S	Fox Creek, Alta. Canada. No. 1 cylinder, fillets between cooling fins. Ref: MoT Canada file W10083.
E394	Mooney M-20K	25 Jul 81	0	S	Defuniak Springs, Fl. USA. No. 2 conrod. Ref: NTSB file 3-2186.
E395	Mooney M-20F	30 Jul 81	0	S	Licking, Mo. USA. Crankcase. Ref: NTSB file 3-2244.
E396	Rockwell S-2R	5 Aug 81	0	D	Clarksburg, Ca. USA. Cylinder assembly. Ref: NTSB file 3-2344.

E397	Saab-Scania SF37 Viggen (Swedish AF)	29 Aug 81	0	D	Lulea, Sweden. Fuel pipe. Ref: Swedish AF.
E398	Piper PA-32 Cherokee SIX	23 Sep 81	0	S	Cranbrook, B.C. Canada. Crankshaft web. Ref: MoT Canada file P10101.
E399	Bucker Jung 1.131	3 Oct 81	2	D	Baltimore, Md. USA. Crankshaft. Rear cone of prop hub not installed. Ref: NTSB file 3-3089.
E400	Aero Commander S-2R	4 Oct 81	0	S	Bakersfield, Ca. USA. No. 1 cylinder (threads). Ref: NTSB file 3-2365
E401	Cessna A150L	11 Oct 81	1	D	Oak Ridge, Tn. USA. No. 4 cylinder. Ref: NTSB file 3-3091.
E402	Piper PA-32 Cherokee SIX	24 Nov 81	0	S	Woodland, Ca. USA. No. 5 cylinder. Ref: NTSB file 3-3004.
E403	Cessna 172K	27 Dec 81	0	D	Laguna Beach, Ca. USA. Mixture control wire failed (constant bending). Clamp bolt would not rotate. NTSB file 3-3274.
E404	Airbus Ind. A300 (Air France)	17 Mar 82	0	D	Sanaa Airport, North Yemen. H. p. turbine disk failed, fillet radius. GE CF6-50 engine. Ref: AWST 5 Apr 82 p 33.
E405	Swearingen SA-226TC Metro II	23 Mar 82	0	S	Saskatoon, Sask. Canada. Stator support (thermal fatigue due to engine start-ups). Ref: MoT Canada file C20022.
E406	Lockheed C-5A Galaxy (USAF)	May-Oct 82	?	?	USA? Cracking in compressor rear frames, GE TF39-1C engine. Fire caused $400,000 damage. Ref: AWST 18 Oct 82 p 19.
E407	Lockheed C-5A Galaxy (USAF)	May-Oct 82	?	?	USA? Cracking in compressor rear frames, GE TF39-1C engine. Fire caused $1,200,000 damage. Ref: AWST 18 Oct 82 p 19.
E408	Cessna 177	29 Aug 82	0	S	Midnapore, Alta. Canada. Gearing failure in oil pump. Ref: MoT Canada file W20072.

Total Fatalities: 536

APPENDIX F

FIXED-WING AIRCRAFT - PROPELLER

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
F1	Type unknown	pre-1941	0	D	USA. Propeller blade. Origin: stress concentration where patent number was stamped into blade. 115 airframe hours. Ref: pp 2-3 in PREVENTION OF THE FATIGUE OF METALS UNDER REPEATED STRESSES, Batelle Memorial Institute staff, 1941.
F2	Douglas DC-3	11 Jan 46	0	S	Indianapolis, Ind. USA. Right propeller. Ref: WAAS p. 1/46.
F3	Lockheed L-049 Constellation (T.W.A.)	18 Nov 47	5	D	New Castle, Delaware USA. Propeller blade. Ref: WAAS p 20/47.
F4	Lockheed L-649 Constellation (Eastern)	7 Feb 48	1	S	Bunnell, Fla. USA. Propeller blade. Ref: WAAS p 4/48
F5	Douglas DC-6 (American Airlines)	21 Aug 50	1	S	Eagle, Colo. USA. Propeller blade (scratch on blade). Ref: ICAO Circular 24-AN/21, 1952, p. 11.
F6	Boeing 377 Stratocruiser (Pan American)	29 Apr 52	50	D	Carolina, Brazil. Propeller failure caused separation of no. 2 engine. Ref: WAAS p 7/52; AW May 9/55, p 18
F7	Fairchild C-119 Packet (USAF)	Nov 52	9	?	Billings, Montana USA. Propeller blade broke 46 inches from tip. Ref: AW Jan. 19/53 p. 17.
F8	Lockheed L-749A Constellation (Air France)	3 Aug 53	4	D	Fethiye, Turkey. Propeller blade. Ref: WAAS p 15/53.
F9	Boeing 377 Stratocruiser (Pan American)	26 Mar 55	4	D	Off Oregon coast, USA. No. 3 engine tore loose after propeller failure. Ref: AW Jan. 2/56 pp 45-53.
F10	Douglas DC-6A (Pan Am)	21 Jun 59	0	D	Shannon, Ireland. No. 1 blade of no. 4 prop. Previous blade bending disrupted compressive stresses in shot peened area. Ref: WAAS p. 12/59

F11	Cessna 180	22 Nov 61	1	D	Mangakino, New Zealand. Propeller blade separated. Crack on inside of clamp of propeller blade. Role: agricultural fertilizing. Ref: NZ AIB Report 25/3/1194
F12	de Havilland DHC-1 Chipmunk	18 Jun 62	0	S	Winnipeg, Man. Canada. Prop blade shed just outboard of attaching bolts (fretting from inadequate torquing). Ref: MoT Canada file 1694.
F13	Grumman G-21A Goose (Avalon)	17 Jul 62	0	S	Catalina Is., Cal. USA. No. 3 prop blade (blade retention flange radius at blade trailing edge). REF: USACAD.
F14	Beech A55 Baron	30 Jan 64	0	S	Kansas City, Mo. USA. Propeller (threads). Ref: NTSB file 3-0395.
F15	Cessna 210	1 Feb 64	0	S	Bolivar, Mo. USA. Propeller blade. Ref: NTSB file 3-0194.
F16	Cessna 185	13 Apr 64	0	S	Sullivan Bay, B.C. Canada. Propeller blade at thread roots. Ref: MoT Canada file 2221.
F17	Douglas DC-6B (Ansett-ANA)	14 Apr 64	0	S	Melbourne, Australia. No. 3 blade of no. 3 prop (8.5" from butt). Origin: surface burn (electrical?). Ref: WAAS p. 11/64.
F18	Mooney Mk21	7 Jul 64	0	S	Mansfield, Mo. USA. Propeller blade. Ref: NTSB file 3-1981.
F19	Mooney M-21	6 Sep 64	0	S	Calpine, Cal. USA. Propeller blade. Ref: NTSB file 3-3503.
F20	Beechcraft E18S	16 Sep 64	0	S	Fort Lauderdale, Fla. USA. Propeller blade. Ref: NTSB file 3-2927.
F21	Piper PA-28 Cherokee	9 Dec 64	0	S	Burbank, Cal. USA. Propeller blade. Ref: NTSB file 3-3893.
F22	Stinson 108-3	29 Dec 64	0	D	Van Nuys, Calif. USA. Propeller blade. Ref: NTSB file 2-0880.
F23	Beech E18S	3 Jan 65	4	D	Henderson, Ky. USA. Engine tear-away after in-flight separation of no. 1 propeller blade. NTSB file 2-0599
F24	Cessna 180	3 Jan 65	0	S	Burns, Ore. USA. Propeller blade (threads). NTSB file 3-3949.
F25	Lockheed L-188 Electra	15 Feb 65	0	S	Okarche, Okla. USA. Propeller, manufacturer defect. NTSB file 2-0062.
F26	Mooney M-20E	16 Feb 65	0	S	Woodward, Okla. USA. Propeller blade (sharp nick). NTSB file 3-0792.

F27	Boeing A75-N1 Stearman	8 Mar 65	1	D	Sherrill, Ark. USA. Propeller, blade retention mechanism. Ref: NTSB file 2-0281
F28	Temco D-16A	7 Apr 65	0	D	Jacksonville, Texas USA. Right propeller blade 30 in. from hub. Ref: NTSB file 3-2125.
F29	Ercoupe 415C	6 May 65	0	S	Carlsbad, Cal. USA. Propeller failure (taper hub), improperly secured prop hub bolts. Ref: NTSB file 3-1669.
F30	Beech 95-B55 Baron	6 Jun 65	0	S	Schenectady, N.Y. USA. Right engine propeller mounting bolts. Ref: NTSB file 3-3270.
F31	Boeing A75 Stearman	9 Jul 65	0	S	Homedale, Id. USA. Propeller blade (12" from tip). NTSB file 3-2100.
F32	Stinson 108	19 Aug 65	0	S	Fairbanks, Alas. USA. Prop blade. Metal leading edge separated from wood prop blade. Ref: NTSB file 3-2458.
F33	Piper PA-28 Cherokee	11 Jan 66	0	S	Fayetteville, Ark. USA. Propeller blade. Ref: NTSB file 3-0084.
F34	Mooney M-20B	6 Feb 66	0	S	Bellview, N.Mex. USA. Propeller blade broke 15" from tip. Ref: NTSB file 3-4432.
F35	Convair 240 (Trans-Texas)	12 May 66	0	S	Fort Worth, Tex. USA. Right engine no. 3 propeller blade. Ref: NTSB file 1-0036.
F36	Fleet Model 1	15 May 66	0	S	St. Petersburg, Fla. USA. Propeller hub. Ref: NTSB file 2-0067.
F37	Beech A23 Musketeer	6 Jul 66	0	S	Boulder, Colo. USA. Propeller blade (improper blade). Ref: NTSB file 3-4390.
F38	Piper PA-28 Cherokee	10 Jul 66	0	S	Flushing, N.Y. USA. Propeller blade (origin: small pit). Ref: NTSB file 3-4014.
F39	Piper PA-28 Cherokee	23 Jul 66	0	S	Columbia City, Ind. USA. Propeller blade failed across the mid-blade decal. Required corrosion inspection not done. Ref: NTSB file 3-2402.
F40	Cessna 180	24 Jul 66	0	S	Athabasca, Alta. Canada. 5 1/2 inches of no. 1 blade shed, (nick). Ref: MoT Canada file 3055.

F41	de Havilland 114 Heron	3 Aug 66	0	S	San Juan, Puerto Rico. No. 4 propeller separated (prop barrel). Ref: NTSB file 3-4407.
F42	Boeing A75 Stearman	14 Aug 66	0	D	Dos Palos, Calif. USA. Propeller blade. Ref: NTSB file 3-2419.
F43	Snow 600 S-2C	29 Aug 66	0	S	Bay, Ark. USA. Propeller blade, 13" from tip. NTSB file 3-2805
F44	Boeing A75 Stearman	2 Sep 66	0	S	Gustine, Cal. USA. Blade in shank area (unapproved blades). Ref: NTSB file 3-2511.
F45	Beech D18S	10 Feb 67	3	D	Dallas, Texas USA. Propeller blade at shank radius. Ref: NTSB file 2-0120
F46	Convair 340 (Lake Central)	5 Mar 67	38	D	Marseilles, Ohio. USA. 4 prop blades separated. Helical splines of torque piston failed because of omission of nitriding process. Torque cylinder of blade pitch-change unit failed from fatigue. Ref: NTSB file 1-0001
F47	Mooney M-20E	6 Mar 67	0	S	Pendleton, Ore. USA. 6" of propeller blade separated. NTSB file 3-0923
F48	Mooney M-20C	12 Mar 67	0	S	Mangum, Okla. USA. Propeller hub. Ref: NTSB file 3-0557.
F49	Piper PA-23 Aztec	27 Mar 67	0	S	Granville, N.Y. USA. Right propeller attach studs. NTSB file 3-1023
F50	Boeing 75N1 Stearman	30 Mar 67	0	D	McKittrick, Calif. USA. Propeller blade. Role crop control. Ref: NTSB file 3-1049.
F51	Mooney M-20D	8 Apr 67	0	S	Erie, Colo. USA. Propeller hub. Ref: NTSB file 3-1194.
F52	Mooney M-20E	15 May 67	0	S	Dighton, Kans. USA. Prop blade (4 1/2" from tip). NTSB file 3-1709.
F53	Cessna 185C	18 May 67	0	S	Houma, La. USA. Propeller blade (next to hub). NTSB file 3-4791.
F54	Funk F-23A	26 Jun 67	0	S	Alliance, Neb. USA. Propeller hub at blade attach point. Ref: NTSB file 2-0484.
F55	Cessna 150	29 Jun 67	0	S	Naperville, Ill. USA. 6" of tip of blade separated (stone damage). Ref: NTSB file 3-4631.

F56	Beech A23 Musketeer	8 Jul 67	0	S	Aqua Dulce, Cal. USA. 19" of propeller blade separated. AD not complied with. Ref: NTSB file 3-2291.
F57	Vickers Viscount (Falcon Airways)	23 Jul 67	0	S	Over Germany. Propeller retaining bolt (incorrect assembly). Ref: WAAS p. 16/67.
F58	Cessna 310D	11 Sep 67	0	S	Clovis, N.Mex. USA. 1 foot of left prop failed. NTSB file 3-4819
F59	Boeing B75N1 Stearman	16 Oct 67	0	D	Gilliam. La. USA. Propeller blade. Role crop seeding. Ref: NTSB file 2-0795.
F60	Beech S35 Bonanza	22 Oct 67	0	S	Baton Rouge, La. USA. Propeller (improper heat treated blade and hub workmanship at time of mfg). NTSB file 3-4827.
F61	Stinson 108	22 Oct 67	0	S	Moweaqua, Ill. USA. Crankshaft propeller bolt flange. Ref: NTSB file 2-0785.
F62	Mooney M-20E	29 Oct 67	0	S	Fort McCoy, Fla. USA. Propeller blade. (origin: corrosion pit). Ref: NTSB file 2-1201.
F63	Beech B50 Twin Bonanza	3 Nov 67	0	S	McAllen, Tex. USA. 6 1/2" broke off blade, left propeller. Ref: NTSB file 3-4241.
F64	Beech N35 Bonanza	13 Nov 67	1	D	Camden, Ark. USA. Both control bolts of propeller hub. Ref: NTSB file 2-0931
F65	Snow S-2A	15 Nov 67	1	D	Dateland, Ariz. USA. Propeller blade. Ref: NTSB file 2-1006
F66	Beech V-35 Bonanza	17 Jan 68	0	S	Dell Rapids, S.Dak. USA. Propeller cylinder attach screws. Ref: NTSB file 3-0680.
F67	Cessna 206	8 Feb 68	0	D	E. Prairie, Miss. USA. Crankshaft imbalance caused prop failure. Ref: NTSB file 3-4758.
F68	Cessna P206A	12 Feb 68	0	S	Fort Madison, Iowa. USA. Propeller hub. Ref: NTSB file 3-3447.
F69	Mooney M-20C	24 Apr 68	0	D	Hillsboro, Kansas USA. 18 in. of propeller blade separated. Ref: NTSB file 3-0916.
F70	Cessna 336 Skymaster	4 Jul 68	0	S	Finlay Forks, B.C. Canada Rear propeller blade. Ref: NTSB file 6-0091.

PROPELLER (FIXED-WING)

F71	Pitts Special	21 Jul 68	1	D	Arco, Id. USA. Propeller blade separated 18 in. from tip. Ref: NTSB file 3-3929
F72	Mooney M-20E	28 Jul 68	0	S	Jackson, La. USA. Propeller blade across shank. NTSB file 3-4283
F73	Piper PA-25 Pawnee	7 Sep 68	0	S	St. Joseph, La. USA. Propeller at station 29. NTSB file 3-3065.
F74	Cessna 210C	11 Sep 68	0	S	Patricia, Tex. USA. Propeller blade failed approx. 5" from tip. Ref: NTSB file 3-4872.
F75	Cessna 150F	23 Oct 68	0	S	Bedford, Mass. USA. 4" missing from tip of blade. NTSB file 3-4329.
F76	Cessna 310B	27 Oct 68	0	S	Zanesville, Ohio. USA. Blade of left propeller at hub spider. Ref: NTSB file 3-3782.
F77	Boeing A75N1 Stearman	11 Jul 69	0	S	West Point, Miss. USA. 16" of blade separated. Ref: NTSB file 3-1930.
F78	Boeing 75 Stearman	16 Jul 69	0	S	Hilmar, Cal. USA. Propeller. Ref: NTSB file 3-3203.
F79	Meyers 200A	2 Aug 69	0	S	Vacaville, Cal. USA. Propeller came off, 4 prop hub bolts evidenced prior damage. Ref: NTSB file 3-2518.
F80	Piper PA-28 Cherokee	10 Aug 69	1	D	Los Angeles, Calif. USA. 16 in. of one propeller blade broke off. Ref: NTSB file 3-2645
F81	Cessna 150F	11 Aug 69	0	S	Louisville, Miss. USA. Spinner bulkhead. Ref: NTSB file 3-3367.
F82	Boeing 75 Stearman	16 Aug 69	0	S	Los Banos, Cal. USA. Blade broke 5" from butt end. NTSB file 3-3504.
F83	Mooney M-20B	16 Aug 69	0	D	Quitman, Ark. USA. Propeller blade. Ref: NTSB file 3-3545.
F84	Barrett Cassut	28 Aug 69	1	D	McCordsville, Indiana USA. Propeller. Ref: NTSB file 3-3801.
F85	Beech K35 Bonanza	5 Sep 69	4	D	Provo, Utah USA. Propeller pitch-control bolts. NTSB file 3-2982
F86	Piper PA-30-160 Twin Commanche	24 Nov 69	1	D	Dandaloo, N.S.W., Australia. Most of propeller blade separated. Origin: corrosion in balancing cavity. Australia DoT
F87	Cessna 180G	1970	0	S	Parkes, NSW, Australia. 9 in. of prop blade shed (nick). Ref: Australia

F88	Cessna 180	29 Jun 70	0	S	Bumpy Lake, Ont. Canada. Propeller. Ref: MoT Canada file C00070.
F89	Cessna 172K	8 Aug 70	0	S	Homer, La. USA. Approx. 6" propeller tip missing (blade nick). Ref: NTSB file 3-3398.
F90	Mooney M-20E	3 Oct 70	0	S	Enterprise, Kans. USA. Blade failed 3" outboard of hub flange. Ref: NTSB file 3-2471.
F91	Mooney M-20E	26 Oct 70	0	S	Chugwater, Wy. USA. Propeller blade, 3" from hub. NTSB file 3-4105.
F92	Piper J-3	6 Feb 71	0	S	Portage La Prairie, Man. Canada. Propeller. Ref: MoT Canada file C10009.
F93	Piper PA-28 Cherokee	11 Apr 71	0	S	Elmira, Cal. USA. # 1 blade 19" from tip. AD not complied with. Ref: NTSB file 3-0343.
F94	Cessna 172	1 May 71	0	S	Beaver Falls, Pa. USA. Prop blade near tip. NTSB file 3-1301.
F95	American AA-1 Yankee	2 May 71	0	S	Fort Myers, Fla. USA. 5 1/8" prop blade missing. NTSB file 3-1526.
F96	Fletcher FU-24-950	10 May 71	0	S	Capr Runaway, New Zealand. Pitch-change actuating pin of propeller blade (root radius). Ref: NZ brief 71-048.
F97	Owl Racer 65-2	31 May 71	1	D	Greenwich Reach, England. Half a prop blade shed, tearing out engine. Origin: corrosion pit. Ref: FI 6 June 74 p 741
F98	Aero Commander 500B	21 Jun 71	0	S	Crossett, Ark. USA. Right prop hub spider. NTSB file 3-2073.
F99	Piper PA-28R Cherokee	30 Jun 71	0	S	Carrollton, Ky. USA. Prop blade, 4" from tip. Ref: NTSB file 3-2286
F100	Snow S-2D	4 Aug 71	0	S	Moana, New Zealand. 7 inches of blade shed (stone damage). Ref: NZ brief 71-070.
F101	Piper PA-30 Twin Commanche	6 Aug 71	0	S	Bloomington, Ill. USA. Left prop blade near hub. Ref: NTSB file 3-2891
F102	Aero Commander 500B	18 Aug 71	0	S	Newport, R.I. USA. Left prop blade (hub clamp). NTSB file 3-3264.
F103	Mustang L-2	12 Sep 71	1	S	Indio, Calif. USA Propeller unapproved for engine installation, blade separated. NTSB file 3-1860.

F104	Boeing A75 Stearman	10 Nov 71	0	S	Holtville, Cal. USA. Piece of prop blade shed. NTSB file 3-4428.
F105	Beech 99A Airliner (Frontier)	24 Nov 71	0	S	Greeley, Colo. USA. Right prop blade failed (improper machining in balance hole cavity). Ref: NTSB file 1-0026.
F106	Cessna 185	1972	0	S	Albany, WA, Australia. Propeller detached. Ref: Australia DoT.
F107	Cessna 120	13 Feb 72	0	S	Beaumont, Kans. USA. Propeller blade. Ref: NTSB file 3-2029.
F108	Transavia PL-12 Airtruk	3 Mar 72	0	S	Roydon Downs, New Zealand. Propeller hub. Ref: NZ brief 72-033.
F109	Beech 95 Travel Air	5 Apr 72	1	D	Miami, Fla. USA. Right prop blade failed 1 inch from base of shank. Ref: NTSB file 3-0689
F110	Beech M35 Bonanza	12 May 72	1	D	Florissant, Mo. USA. Prop pitch-change bolts. NTSB file 3-0956.
F111	Cessna P206	16 May 72	0	S	Fremont, Cal. USA. Blade separated, crankshaft sheared at mounting flange. Ref: NTSB file 3-0176.
F112	Cessna P206	18 May 72	0	S	Huntington Beach, Cal. USA. Propeller blade. Ref: NTSB file 3-3953.
F113	Transavia PL-12 Airtruk	26 May 72	0	S	Wainui, New Zealand. Propeller blade (thread). Ref: NZ brief 76-053
F114	Cessna 310J	22 Aug 72	0	S	Wichita Falls, Tex. USA. Propeller blade. Ref: NTSB file 3-3023.
F115	Cessna 172	29 Sep 72	0	S	Clinton, Mich. USA. Propeller blade. Ref: NTSB file 3-3593.
F116	Cessna 185E (floats)	5 Oct 72	0	S	Keswick, Ont. Canada. Propeller blade actuating pin (incorrect washer installed). Ref: MoT Canada file 020095.
F117	American AA1-A	30 Dec 72	0	S	Show Low, Ariz. USA. Propeller blade. Ref: NTSB file 3-4002.
F118	Cessna A188-A	1973	0	S	Wee Waa, NSW, Australia. Propeller hub. Ref: Australia DoT.
F119	Piper PA 28-180 Cherokee	1973	0	S	Warwick Qld. Australia. 6 inches of prop blade shed (stone damage) Ref: Australia DoT.
F120	Fletcher FU-24	3 Apr 73	0	S	Waotu, New Zealand. Propeller at blade root. Ref: NZ brief 73-073.

F121	Cessna 172K	6 Apr 73	0	S	Oceanside, Cal. USA. Propeller blade (8" from tip). NTSB file 3-1106.
F122	Aero Commander 500B	1 Jun 73	0	S	Crownpoint, N. Mex. USA. Propeller: blade retention mechanism. Ref: NTSB file 3-2512.
F123	Aero Commander 100	8 Jun 73	0	S	Albany, N.Y. USA. Propeller blade (7" from tip). NTSB file 3-1318.
F124	Cessna 310I	18 Aug 73	0	S	Miami, Fla. USA. Propeller (hub bolt holes). Ref: NTSB file 3-3833
F125	Cessna 206	9 Sep 73	0	S	East Boston, Mass. USA. Propeller hub. Ref: NTSB file 3-3663.
F126	Piper PA-31 Navajo	25 Sep 73	0	S	Roswell, N. Mex. USA. 1 ft of right prop blade shed. NTSB file 3-3054
F127	Cessna 206F	3 Nov 73	0	S	Nagoya, Japan. Screw parts of #2 prop blade. Ref: Japan MoT.
F128	Mooney M-20A	12 Nov 73	1	D	Innisfree, Alta. Canada. Propeller. Ref: MoT Canada file W30093.
F129	Meyers 200B	14 Nov 73	0	S	Savannah, Ga. USA. Propeller (origin: root of top outboard thread) Ref: NTSB file 3-3994.
F130	Cessna 210-5A	1974	0	S	Morwell, Vict. Australia. Propeller blade shed. Ref: Australia DoT.
F131	Beech 95-B55 Baron	29 Jan 74	0	S	Goodyear, Ariz. USA. Propeller hub. Ref: NTSB file 3-0266.
F132	Piper PA-32 Cherokee SIX	29 Mar 74	0	S	Minto, Alas. USA. Propeller (pitch change dowel). Ref: NTSB file 3-3770.
F133	Mooney M-20E	20 Jul 74	2	D	Custer, S. Dakota USA. Propeller blade (shot-peened area). Ref: NTSB file 3-4198
F134	Beech 35 Bonanza	24 Jul 74	0	S	Bellevue, Tex. USA. Propeller blade (near blade shank). Ref: NTSB file 3-4334.
F135	Cessna 150	28 Jul 74	0	S	Erin, Ont. Canada. Propeller. Ref: MoT Canada file 040093.
F136	Cessna 210K	18 Aug 74	0	D	Joy, Ky. USA. Propeller blade. Ref: NTSB file 3-3004.
F137	Globe GC-1B	20 Aug 74	1	S	Manchester, Tenn. USA. Propeller hub, 21 inches from clamp assembly strap. Ref: NTSB file 3-3030

F138	Mooney M-20C	25 Aug 74	0	S	Stanfield, Ariz. USA. Propeller blade. Ref: NTSB file 3-2798.
F139	CallAir A-9	5 Sep 74	0	D	Amarillo, Texas USA. Propeller blade. Role: crop spraying. Ref: NTSB file 3-2865.
F140	Boeing A75 Stearman	27 Sep 74	0	S	Dos Palos, Cal. USA. Propeller blade (3" from butt end). Ref: NTSB file 3-2834.
F141	Beech E18S	7 Oct 74	0	S	Topeka, Kans. USA. Prop failure, right engine (wrong crankshaft counterweight combination installed). Ref: NTSB file 3-4284.
F142	Cessna 182	28 Nov 74	0	S	Lewiston, Id. USA. Propeller separated. Ref: NTSB file 3-4323.
F143	Fuji FA 200-180 Aero Subaru	6 Mar 75	0	S	Hokkaido, Japan. Screw parts of #2 prop hub. Ref: Japan MoT.
F144	Cessna 180	25 Apr 75	0	S	Jackson, Wy. USA. Propeller blade (at tip). Blade shortened 1". File marks on blade. Ref: NTSB file 3-1329.
F145	Cessna A188A	15 May 75	0	S	Merced, Cal. USA. Propeller hub. Ref: NTSB file 3-1130.
F146	Aero Commander 100	24 May 75	0	S	Stowe, Vt. USA. Part of prop blade shed. NTSB file 3-3896.
F147	Grumman American AA-1B	25 May 75	0	S	Tampa, Fla. USA. 4" blade tip shed (pits). NTSB file 3-1526.
F148	Piper PA-18 Super Cub	31 May 75	0	S	Carp, Ont. Canada. Propeller blade tip shed (nick or pit on leading edge). Ref: MoT Canada file 050041.
F149	Cessna 185	24 Jun 75	0	S	Churchill, Man. Canada. Propeller (severe dent on leading edge). Ref: MoT Canada file C50075.
F150	Boeing A75L3 Stearman	26 Jun 75	0	S	Hickman, Cal. USA. Blade separated 5" from butt end. Ref: NTSB file 3-1599.
F151	Beech J35 Bonanza	1 Jul 75	0	S	Sparta, Ky. USA. Prop blade pitch control bolts. NTSB file 3-2669.
F152	Piper PA-28 Cherokee	6 Jul 75	0	S	Weston, W.V. USA. Lost 22" of blade. Ref: NTSB file 3-2192.
F153	de Havilland D.H.114 Heron	11 Jul 75	0	S	San Juan, Puerto Rico. Propeller blade. Ref: NTSB file 3-1773.

F154	Cessna 177 Cardinal	18 Jul 75	0	D	Cambridge Narrows, N.B. Canada. Several inches of prop shed (nick). Ref: MoT Canada file A50028.
F155	Cessna 177B	20 Jul 75	0	S	Aledo, Ill. USA. Propeller at file marks repairing previous damage. Ref: NTSB file 3-3972.
F156	Cessna 207	10 Aug 75	0	S	Topeka, Kans. USA. Propeller hub. Ref: NTSB file 3-3981.
F157	Socata 894A Rallye Minerva	26 Sep 75	0	S	Hamm-Lippewiesen, W. Germany. Adjustment fork broken in hydraulic pitch control system for propeller. Ref: W. German file 3X0446.
F158	Piper PA-32 Cherokee SIX	14 Oct 75	0	D	South Boston, Va. USA. Propeller blade pitch-change dowel failed, propeller failure. Ref: NTSB file 3-3555.
F159	Aero Commander 112A	5 Nov 75	0	D	McFarland, Calif. USA. About 6 inches of propeller separated. Ref: NTSB file 3-3351.
F160	Fuji FA 200-160 Aero Subaru	10 Nov 75	0	S	Oita, Japan. Prop blade (stone pit at back side). Ref: Japan
F161	Beech A23A Musketeer	1976	1	D	Australia. Most of prop blade shed. Ref: Australia DoT.
F162	Mooney M-20C	24 Jan 76	0	S	Fontana, Cal. USA. Propeller hub (blade socket retention threads). Ref: NTSB file 3-1564.
F163	Cessna 310J	29 Jan 76	0	S	Lubbock, Tex. USA. Blade separated from hub, right engine. Ref: NTSB file 3-2580.
F164	Beech V35 Bonanza	30 Jan 76	2	D	Meigs, Ga. USA. No. 2 prop blade actuating pin. Ref: NTSB file 3-0631
F165	Douglas DC-6 (Mercer Airlines)	8 Feb 76	3	D	Van Nuys, Calif. USA. Propeller blade. Leading edge under de-icer boot. Ref: NTSB-AAR-76-17
F166	Transavia PL-12 Airtruk	18 Feb 76	0	S	Matahiwi, New Zealand. Propeller blade. Ref: NZ brief 76-029
F167	Piper PA-28R Cherokee	22 Feb 76	0	S	Little Rock, Ark. USA. 6 prop bolts failed. Ref: NTSB file 3-0825.
F168	Cessna 336 Skymaster	11 Mar 76	4	D	McGregor, Iowa USA. Propeller separated. Ref: NTSB file 3-1960.

F169	American AA-1B	27 Apr 76	0	S	Gorman, Cal. USA. Propeller (nick). Ref: NTSB file 3-1444.
F170	Cessna 337	4 May 76	0	S	Barrow, Alas. USA. Rear prop dowel pin on pitch change mechanism. Ref: NTSB file 3-1332.
F171	Cessna 182	27 May 76	0	S	Vallejo, Cal. USA. Propeller blade (last thread in hub). Ref: NTSB file 3-1459.
F172	N. American Commander 500	12 Jul 76	0	S	Kamloops, B.C. Canada. Right propeller blade shed (corrosion pits). Ref: MoT Canada file P60037.
F173	Piper PA-23 Aztec	16 Aug 76	0	S	Miami, Fla. USA. Propeller separated. Ref: NTSB file 3-4111.
F174	Cessna 310L	21 Aug 76	0	S	Carpenter, S.D. USA. Engine counterweight dampers out of tolerance. Engine mount structure bent. Fatigued prop hub. Ref: NTSB file 3-3557.
F175	Piper PA-23 Aztec	15 Sep 76	0	D	Independence, Mo. USA. 3 propeller mounting studs. NTSB file 3-4081.
F176	Boeing A75 Stearman	18 Sep 76	1	D	Parlier, Calif. USA. Propeller blade broke 5 in. from butt. Role aerial application. Ref: NTSB file 3-2535
F177	Cessna 182M	24 Nov 76	0	S	Grain Valley, Mo. USA. Propeller blade separated from hub (threaded area). Ref: NTSB file 3-3674.
F178	N. American Rockwell 112	31 Dec 76	0	S	Wildorado, Tex. USA. Propeller blade. Ref: NTSB file 3-4181.
F179	Britten-Norman BN2A-8 Trislander	14 Jan 77	0	S	St. Thomas, Virgin Islands. Propeller blade. Ref: NTSB file 3-1856.
F180	Piper PA-28R Cherokee	9 Mar 77	0	S	Petal, Miss. USA. Propeller blade. Ref: NTSB file 3-4122.
F181	Beech 95-C55 Baron	25 Mar 77	0	S	Mackay Qld., Australia. Propeller hub. 100 hr check not done. Ref: Australia DoT.
F182	Beech T-42A Cochise (US Army)	25 May 77	0	D	Al. USA. No. 1 propeller hub assembly. Ref: US Army
F183	Grumman TBM-3E Avenger	9 Jun 77	0	D	Blissville, N.B. Canada. Propeller blade (corrosion-induced fatigue). Ref: MoT Canada file A70014.

F184	Beech 23 Sundowner	25 Jun 77	0	S	Matane, Que. Canada. Prop blade failed 9" from end (undressed dent on leading edge). Ref: MoT Canada file Q70060.
F185	Volpar H18	20 Jul 77	0	S	Galena, Alas. USA. Propeller pitch changing mechanism. Ref: NTSB file 3-3400.
F186	Champion 7FC	20 Aug 77	0	S	Moline, Ill. USA. Propeller blade. Ref: NTSB file 3-2989.
F187	Cessna 182	18 Sep 77	0	S	Granite City, Ill. USA. Two 5th order dampers on crankshaft caused imbalance. Propeller separated. NTSB file 3-3706
F188	Beech E18S	1 Oct 77	0	D	Plymouth, In. USA. Propeller (nick). Ref: NTSB file 3-4251.
F189	Waco UPF-7	29 Oct 77	2	D	Palmyra, NY. USA. 13 in. of propeller blade separated. Ref: NTSB file 3-3831
F190	Piper PA 28-180 Cherokee	1978	0	S	Glen Innes, NSW, Australia. Prop blade. Ref: Australia DoT.
F191	Beech S35 Bonanza	19 Mar 78	4	D	Carrabassett, Maine USA. 6 inches of propeller blade separated. Ref: NTSB file 3-1869
F192	Aero Commander 500	4 Apr 78	0	S	Miami, Fla. USA. Left propeller blade separated. NTSB file 3-1097.
F193	Cessna 336	24 Apr 78	0	S	Gisborne, New Zealand. Prop hub and retaining nut failed from fatigue. Ref: NZ brief 78-063.
F194	Aero Commander S-2R	28 Apr 78	0	S	Stringtown, Ms. USA. Propeller blade. Ref: NTSB file 3-1236.
F195	Cessna 210K	28 Apr 78	0	S	Corona, N.M. USA. Propeller blade separated. Blades had previous damage straightened. Ref: NTSB file 3-1549.
F196	Piper PA 28R-180 Cherokee	5 May 78	0	S	Ehime Pref., Japan. Oil line tube assembly of propeller governor (stress concentration). Ref: Japan MoT.
F197	Piper PA-28 Cherokee	8 May 78	0	S	Royalton, N.Y. USA. Propeller blade. Ref: NTSB file 3-3335.
F198	Grumman G-164 AgCat	23 May 78	0	S	Iowa, La. USA. 18 inches missing from blade. NTSB file 3-1166
F199	Beech V35 Bonanza	4 Jun 78	0	S	East Jordan, Mich. USA. No. 2 blade actuating pin. Ref: NTSB file 3-1670.

F200	Mooney M-20C	6 Jun 78	0	S	Bennett, Col. USA. Propeller at indentation on edge of blade. Ref: NTSB file 3-1807.
F201	Beech V35 Bonanza	11 Jun 78	0	S	Jackson Hole, Wy. USA. Prop. AD not complied with. NTSB file 3-4450.
F202	Cessna 177	2 Aug 78	0	S	Eagle River, Wis. USA. Propeller blade (gouge 8" from tip). Ref: NTSB file 3-4292.
F203	Cessna 172L	6 Aug 78	0	S	Skwentna, Ak. USA. Propeller blade. Ref: NTSB file 3-3055.
F204	Cessna 182C	10 Sep 78	0	S	Hudson, N.Y. USA. Propeller blade actuating link elongated, failed in fatigue. NTSB file 3-3339
F205	Piper PA-18A Super Cub	7 Dec 78	0	S	Cooper Landing, Ak. USA. Propeller blade. Ref: NTSB file 3-3533.
F206	Piper PA-28 Cherokee	22 Dec 78	4	D	Kennett, Mo. USA. Propeller separated. Ref: NTSB file 3-4239
F207	Midget Mustang	27 Dec 78	0	S	Prescott, Ariz. USA. 13" of # 1 blade shed (dent in leading edge). Ref: NTSB file 3-4326.
F208	Piper PA-31 Navajo	26 Jan 79	0	S	Lima, N.Y. USA. Right propeller blade tip. NTSB file 3-0280.
F209	de Havilland DHC-6 Twin Otter	27 Feb 79	0	S	Cheyenne, Wy. USA. Propeller system: control unit, PCV - fatigue fracture. Ref: NTSB file 3-2477.
F210	Thorp T-18 Tiger	11 May 79	0	D	Zillah, Wa. USA. Propeller blade. Ref: NTSB file 3-1034
F211	Rockwell Thrush Commander	2 Jun 79	0	S	Lottery, Jamaica. Propeller blade. Ref: Jamaica.
F212	Cessna 150	6 Jul 79	0	S	Milwaukee, Wis. USA. Propeller missing 5" of blade tip. Ref: NTSB file 3-2300.
F213	Piper PA-28 Cherokee Cruiser	16 Aug 79	2	D	Wildwood, Alta. Canada. 5 inches of prop blade separated. Crack in blade previously repaired by removal of material, but incipient crack remained. Ref: MoT file 79-W0071.
F214	Cessna 180 Skywagon	19 Aug 79	0	S	Atlin Lake, B.C. Canada. Blade broke at hub attachment (threads). Ref: MoT Canada file P90073.

F215	Cessna A188A AGwagon	5 Nov 79	0	S	Stratford, New Zealand. Threaded shank of prop. Ref: NZ brief 79-124.
F216	Cessna 150	1980	0	S	Wiluna, WA, Australia. 14 cm of prop blade shed (stone damage). Ref: Australia DoT.
F217	Piper PA 23-250 Aztec	4 Feb 80	0	S	Williams Lake, B.C. Canada. Propeller hub spider arm. (lack of grease). Ref: MoT Canada file P00005.
F218	Cessna 150 Super	23 Feb 80	0	S	Joensuu Airport, Finland. Propeller blade. Ref: Finland BoA.
F219	Cessna 185 Skywagon	23 Mar 80	0	S	Dawson City, Y.T. Canada. 30" of blade shed (nick). Ref: MoT Canada file W00026.
F220	Bucker Jung BU-131	4 May 80	0	S	Colwich, Ks. USA. Fatigue fracture of prop. Corrosion discoloration present. Ref: NTSB file 3-1205.
F221	Beech 95-B55 Baron	17 Jul 80	0	S	Malden, Mo. USA. Hartzell prop hub clamp. Ref: NTSB file 3-3231.
F222	Beech F33A Bonanza	1 Oct 80	0	S	Arlington, Az. USA. Propeller blade. Ref: NTSB file 3-2540.
F223	Mooney M-20C	16 Oct 80	0	S	Willcox, Az. USA. 21" of blade shed (possible high stress from blade straightening). Ref: NTSB file 3-3701.
F224	Piper PA-32 Cherokee SIX	1 Nov 80	0	S	Carlsbad, N.M. USA. 8 inches of propeller shed (origin: nick). Ref: NTSB file 3-3686.
F225	Mitsubishi MU-2J	30 Nov 80	0	D	Port Aransas, Tex. USA. Prop blade. Origin: stress corrosion crack. Ref: NTSB file 3-3557.
F226	Cessna A188B	1981	0	S	Naradhan, NSW, Australia. Propeller shaft. Ref: Australia DoT.
F227	Cessna 206	3 Mar 81	0	S	Lae, Papua New Guinea. Propeller blade. Ref: Papua New Guinea
F228	Cessna 172P	1 Jul 81	0	S	Thief River Falls, Mn. USA. Propeller failed 12" from hub centre line (trailing edge nick). Ref: NTSB file 3-1521.
F229	Cessna P206A	28 Jul 81	0	S	Marathon, Fl. USA. McCauley hub separated. Dynamic dampener beyond limits. Ref: NTSB file 3-2183.

F230	Cessna A188B	7 Aug 81	0	D	Bastrop, La. USA. McCauley prop hub. Inadequate inspection. Ref: NTSB file 3-1975.
F231	Piper PA-24 Commanche	29 Aug 81	0	S	Sacramento, Ca. USA. Propeller blade. Ref: NTSB file 3-2334.
F232	Beech 58 Baron	27 Oct 81	0	S	Selma, Al. USA. McCauley prop hub. Ref: NTSB file 3-2047.

Total Fatalities: 162

APPENDIX G

FIXED-WING AIRCRAFT - LANDING GEAR

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
G1	Handley Page H.P. 50 Heyford Mk. 1 (RAF)	10 Jun 32	?	?	Upper Heyford, UK. Starboard outer end of lower centre-section front spar failed (fatigue), causing right undercarriage to collapse. Ref: Barnes, HANDLEY PAGE AIRCRAFT SINCE 1909, p 297.
G2	US medium patrol bomber (tail-wheel) (USAAC)	Oct 42	?	?	? Failure in torque scissors fitting welded to outer cylinder of main gear shock strut (Bendix). Weld between fitting & cylinder barrel. Ref: MacLean, AERONAUTICAL ENG. REVIEW, Nov/45, p 12.
G3	US medium patrol bomber (tail-wheel) (USAAC)	WW II	?	?	USA? Failure in drag brace strut fitting on outer cylinder of main gear shock strut (Bendix). Ref: MacLean, AERONAUTICAL ENG. REVIEW, Nov/45, p 16.
G4	N. American B-24 Liberator (USAAC)	1944	?	?	? Nose gear failure. Ref: Boggs, AFFDL TR-79-3071 p 132; Boggs in ASTM STP 613, p 5.
G5	Convair B-36 (USAF)	1953-59	?	?	? Starboard landing gear (threads). Ref: J.D. Caldara, pp 10, 23 & 24 in WADC TR 59-507, 1959
G6	Vickers Viscount (BEAC)	12 Dec 54	0	S	Blackbushe Airport, UK. Back-stay bracket of right gear. Ref: WAAS p 21/54.
G7	Vickers Viscount (TAA)	30 Apr 57	0	S	Townsland, Qld. Australia. Trunnion block. Nose gear actuating jack disconnected from strut. Ref: WAAS p 7/57.
G8	Lockheed L-749 (Eastern)	18 Dec 58	0	S	Atlanta, Ga. USA. Lower drag strut terminal of right main gear. Ref: WAAS p 22/58.
G9	Lockheed L-1049 (TWA)	17 Jan 59	0	S	Olathe, Kan. USA. Landing gear down-lock strut. Ref: USACAD.
G10	Douglas DC-3 (Allegheny)	22 Jan 59	0	S	Huntington, WV USA. Centre wing to drag strut attach fitting, at lower attach bolt holes. Ref: WAAS p 3/59.

G11	Vickers Viscount 700D	3 Apr 59	0	S	Detroit, Mich. USA. Distortion of landing gear uplock lever due to fatigue cracks. Ref: USACAD
G12	Cessna 180 (on skis)	24 Apr 59	0	S	Martin Lake, Sask. Canada. Right gear leg at bolt holes. (Spring steel). Ref: MoT Canada file 635.
G13	Cessna 180 (wheel-ski)	13 May 59	0	S	Point Barrow, Alaska USA. Starboard landing gear strut at bolt holes at wheel attachment end. Ref: USACAD.
G14	Boeing 707 (PAWA)	12 Jul 59	0	S	New York, USA. 2 front wheels of left main gear separated. Origin: peen mark made by contact between truck beam & anti-rotation bolt. Ref: WAAS p 13/59
G15	Cessna 180	31 Aug 59	0	S	Athabasca, Alta. Canada. Right gear leg at two top bolt holes. Ref: MoT Canada file 770.
G16	Curtiss C-46F (Zantop)	9 Sep 59	0	S	Dallas, Tex. USA. Front spar attachment fittings of right gear (bolt hole). Ref: WAAS p 17/59.
G17	Cessna 180 (on skis)	9 Dec 59	0	S	Beaverhill Lake, Man. Canada. Right gear leg at top two bolt holes where ski axle is attached. Ref: MoT Canada file 859.
G18	Douglas DC-3 (Trans Texas)	23 Dec 59	0	S	Tyler, Tex. USA. Brace strut of right gear. Ref: WAAS p 25/59
G19	Lockheed L-749 (Eastern)	3 Jan 60	0	S	Philidelphia Pa. USA. Right gear strut cylinder. Ref: USACAD.
G20	Lockheed L-749 (Eastern)	4 Jan 60	0	S	Washington, D.C. USA. Right gear strut cylinder. Ref: USACAD.
G21	Martin 4-0-4 (TW)	28 Feb 60	0	S	Olathe Kan. USA. Left main gear gland nut. Ref: USACAD.
G22	Lockheed L-1049G (TW)	29 Feb 60	0	S	Chicago, Ill. USA. Drag strut of right main gear. Ref: USACAD
G23	Airspeed Ambassador (BKS)	3 Mar 60	0	S	Woolsington Airport, UK. Port landing gear down-lock latch plate. Ref: WAAS p. 8/60.
G24	Douglas DC-3 (North Central)	13 Aug 60	0	S	Madison, Wis. USA. Strut brace fitting of left gear. Ref: USACAD.
G25	Bristol Brittania (BOAC)	11 Nov 60	0	S	Khartoum, Sudan. Support member for starboard main gear uplock. Ref: WAAS p. 26/60.

G26	Cessna 180	24 Nov 60	0	S	Wheatcroft Lake, Man. Canada. Left gear leg (upper two bolt holes). Ref: MoT Canada file 1178.
G27	Cessna 170A	9 Jan 61	0	S	St. Francois de Montmagny, Que. Canada. Right gear leg (2 top axle attachment holes). Spring steel. Ref: MoT Canada file 1227.
G28	Fokker F-27 (Piedmont)	17 Feb 61	0	S	Goldsboro, N.C. USA. Upper drag strut hinge pin bolt (right gear). Ref: WAAS p. 4/61.
G29	Curtiss C-46F	10 Mar 61	0	S	St. Louis, Mo. USA. Left main gear, drag link assembly. Ref: WAAS p. 5/61.
G30	Cessna 150	2 Jun 61	0	S	Vancouver, B.C. Canada. Left gear leg (steel) 8 inches from fuselage attachment. Fretting. Ref: MoT Canada file 1332
G31	Douglas DC-6B (PAA)	26 Jun 61	0	S	Miami, USA. Landing gear uplatch release cable. Ref: WAAS p. 13/61.
G32	Lockheed L-1049G Super Constellation (Eastern)	3 Aug 61	0	D	New York, N.Y. USA. Upper cap weld of right landing gear shock strut cylinder. Ref: Lowell, "Airline Safety is a Myth"
G33	Cessna 180	8 Dec 61	0	S	Red Lake, Ont. Canada. Right gear leg (2 upper bolt holes). Ref: MoT Canada file 1543.
G34	Norseman IV	28 Feb 62	0	S	Mellersh Pt., B.C. Canada. Fitting socket of right float strut attachment. Ref: MOT Canada file 1604.
G35	Douglas DC-3	5 Mar 62	0	S	Sugluk, Que. Canada. Upper truss of right main undercarriage near front gusset. Ref: MOT Canada file 1607.
G36	Douglas DC-6 (Eastern)	7 Mar 62	0	S	Buffalo, NY. USA. Right main-gear oleo strut. Ref: WAAS p. 6/62
G37	Lockheed L-1049 (Eastern)	28 May 62	0	S	New York, USA. Bolt attaching nose gear to drag strut. Ref: WAAS p. 14/62.
G38	Curtiss C-46 (Riddle)	5 Jun 62	0	S	San Juan, Puerto Rico. Side brace, left main gear, improper machining. Ref: WAAS p. 14/62
G39	Armstrong Whitworth Argosy (Capitol)	2 Jul 62	0	S	Wilmington, Del. USA. Lower attach fitting of right gear drag strut. Ref: WAAS p. 16/62.

LANDING GEAR (FIXED-WING)

G40	Douglas DC-7B (Eastern)	12 Mar 63	0	S	Boston, Mass. USA. Right main l/g shock strut cylinder at fillet of torque link lugs. Ref: USACAD.
G41	Curtiss C-46 (Cordova)	5 Sep 63	0	S	Anchorage, Alaska USA. Hydraulic pressure line, external ground service fitting, right gear. Ref: USACAD.
G42	Convair 440 (Delta)	1 Nov 63	0	S	Atlanta, Ga. USA. Wheel axle of left main gear. Origin: fillet at flange. Ref: WAAS p. 20/63.
G43	Curtiss C-46A	1 Jan 64	0	S	Hill AFB, Ut. USA. Main landing gear. Ref: NTSB file 1-0008.
G44	Douglas C-47 (Varig)	11 Jan 64	0	S	Porto Alegre, Brazil. Starboard landing gear. Ref: WAAS p. 2/64.
G45	Cessna 140	9 Feb 64	0	D	Gainesville, Florida USA. Fracture at step plate bolt hole of main gear. NTSB file 3-0320
G46	Cessna 182	22 Feb 64	0	S	Napa, Cal. USA. Nose wheel fork. Ref: NTSB file 3-0448.
G47	Cessna 180	24 Feb 64	0	S	Red Bay, Lab. Canada. Left spring leg at upper bolt holes. Ref: MOT Canada file 2200.
G48	Cessna 170	1 Mar 64	0	S	Oklahoma City, Okla. USA. Gear collapsed. Ref: NTSB file 3-0524.
G49	Lockheed 749 Constellation (TWA)	9 Mar 64	0	S	Boston, Mass. USA. Stress corrosion and fatigue failure of nose gear actuating strut piston rod end clevis. Ref: WAAS p. 7/64.
G50	Sud Aviation Caravelle (SAS)	17 Mar 64	0	S	Copenhagen, Denmark. Nose wheel axle (steel). Ref: WAAS p. 8/64.
G51	de Havilland Comet 4 (Malaysian Airways)	22 Mar 64	0	D	Singapore. Right landing gear main forging at gear leg. Ref: WAAS p. 9/64
G52	de Havilland 104-5 Dove	25 Mar 64	0	S	Hilo, Hawaii. USA. Main gear collapsed. Ref: NTSB file 3-0702.
G53	Cessna 182	4 Apr 64	0	S	Washington, D.C. USA. Nosewheel shimmy damper support bracket. Ref: NTSB file 3-0805.
G54	Meyers 200A	22 Apr 64	0	S	Washington, D.C. USA. Nose wheel fork broken. Ref: NTSB file 3-0999.

G55	Boeing B-17G	27 Apr 64	0	S	Marana, Ariz. USA. Left gear drag strut terminal fitting. Ref: NTSB file 2-0257.
G56	Aero Commander 560	27 Apr 64	0	S	Paducah, Ky. USA. Nose gear extension bolt. Ref: NTSB file 3-1062.
G57	Piper PA-25 Pawnee	28 Apr 64	0	S	Terrell, Tex. USA. Main gear shock strut at lower end weld. Ref: NTSB file 3-1063.
G58	Cessna 150A	2 May 64	0	S	Boca Raton, Fla. USA. Nose gear fork. Ref: NTSB file 3-1126.
G59	Cessna 182	9 May 64	0	S	Northbrook, Ill. USA. Nose gear fork failed in radius of milled section at attach bolt. Ref: NTSB file 3-1211.
G60	Aero Commander 520	20 May 64	0	S	Indianapolis, Ind. USA. Nosewheel torque knee scissors. NTSB file 3-1344.
G61	Cessna 172	22 May 64	0	S	Alachua, Fla. USA. Nose wheel fork. Ref: NTSB file 3-1365.
G62	Beech 35 Bonanza	12 Jun 64	0	S	Piedmont, Okla. USA. Nosegear retract actuator arm. NTSB file 3-1634.
G63	Mooney M-20	12 Jun 64	0	S	Bucklin, Kans. USA. Landing gear handle. NTSB file 3-1636.
G64	Cessna 210	16 Jun 64	0	S	Klamath Falls, Ore. USA. Nose gear hydraulic line assembly. Ref: NTSB file 3-1961.
G65	Piper PA-22	20 Jun 64	0	S	Satanta, Kans. USA. Left gear shock strut (weld). NTSB file 3-1724.
G66	Navion G	1 Jul 64	0	S	Des Moines, Iowa. USA. Nose wheel steering torque tube. Ref: NTSB file 3-1891.
G67	Grumman G-164 AgCat	8 Jul 64	0	S	Port Lavaca, Tex. USA. Gear spring leg at axle attach bolt holes. Ref: Ref: NTSB file 3-1988.
G68	Piper PA-16 Clipper	17 Jul 64	0	S	Clear, Alas. USA. Left front landing gear attach fitting. Ref: NTSB file 3-2101.
G69	Cessna 210	2 Aug 64	0	S	St. Louis, Mo. USA. Piston rod of nose gear actuating hydraulic cylinder (threads). Ref: NTSB file 3-2299.
G70	Piper PA-24 Commanche	28 Aug 64	0	S	Los Angeles, Cal. USA. Nose gear drag link clevis bolt. NTSB file 3-3833.

G71	Cessna 180	29 Aug 64	0	S	Aberdeen, Md. USA. Right gear attach bolt. Ref: NTSB file 3-2674.
G72	Cessna 182	30 Aug 64	0	S	Flagstaff, Ariz. USA. Nose wheel fork. Ref: NTSB file 3-2693.
G73	Aero Commander 520	30 Aug 64	0	S	Morristown, N.J. USA. Nose wheel fork. Ref: NTSB file 3-2694.
G74	Douglas C-47 (Libyan Aviation)	8 Sep 64	0	S	Idiris Airport, Libya. Left-hand brace strut attach fitting. Ref: WAAS p. 20/64.
G75	Culver V	9 Sep 64	0	S	Pacoima, Cal. USA. Right gear retract push-pull tube. Ref: NTSB file 3-2829.
G76	Lockheed L-749 (TWA)	9 Sep 64	0	S	Boston, Mass. USA. Nose gear actuating strut. NTSB file 1-0021.
G77	Cessna 140	11 Sep 64	0	S	Chicago, Ill. USA. Right gear strut at wedges. NTSB file 3-2860.
G78	Beech 65-80 Queen Air	13 Sep 64	0	S	Seward AFB, Tenn. USA. Nose gear chain sprocket attach bolt. Ref: NTSB file 3-2894.
G79	Howard DGA15P	20 Sep 64	0	D	Deridder, La. USA. Left gear attach fitting, main gear. Ref: NTSB file 3-2971.
G80	Cessna 175	24 Sep 64	0	S	Blackfoot, Id. USA. Nose wheel fork cracked by previous damage. Ref: NTSB file 3-3010.
G81	Boeing E75 Stearman	7 Oct 64	0	S	Bakersfield, Cal. USA. Landing gear strut at upper sleeve. Ref: NTSB file 3-3144.
G82	Cessna 182	18 Oct 64	0	S	Cincinatti, Ohio. USA. Old crack in failed area of nose wheel fork. Ref: NTSB file 3-3244.
G83	Cessna 140	20 Oct 64	0	S	Horn Lake, Miss. USA. Main gear (strut saddle showed old crack). Ref: NTSB file 3-3266.
G84	Piper PA-25 Pawnee	22 Oct 64	0	S	Elmira, Cal. USA. Both landing gear shock struts at lower attach fittings. AD not complied with. Ref: NTSB file 3-3291.
G85	Piper PA-24 Commanche	24 Oct 64	0	S	Torrance, Cal. USA. Nose gear drag link clevis broke (threads) Ref: NTSB file 3-3301.

G86	Cessna 170	25 Oct 64	0	S	Marshland, Neb. USA. Landing gear. Fatigue nucleus at radius - improper machining. Ref: NTSB file 3-3842.
G87	Boeing 720 (United)	5 Nov 64	0	S	San Francisco, Cal. USA. Nose gear drag brace lockrod upper attach bolt. Ref: NTSB file 1-0079.
G88	Cessna 175	8 Nov 64	0	S	Wilmington, Ohio. USA. Landing gear spring leaf broke (improper weld). Ref: NTSB file 3-3440.
G89	Canadair CL-44 (Flying Tiger)	12 Nov 64	0	S	Detroit, Mich. USA. Left main gear uplock actuator cylinder. Ref: NTSB file 1-0061.
G90	Boeing 707-123B (American)	12 Nov 64	0	S	Nashville, Tenn. USA. Nos. 5-6 axle section near inner bearing brake collar. 16,000 hrs on part. NTSB file 1-0053.
G91	Douglas DC-4 (Slick)	19 Nov 64	0	S	Norfolk, Va. USA. Right nosewheel yoke end fitting. 5568 hours on part. Ref: NTSB file 1-0057.
G92	Cessna 150	22 Nov 64	0	S	Agawam, Mass. USA. Left gear spring assembly. Ref: NTSB file 3-3543.
G93	Cessna 182	7 Dec 64	0	S	Fayetteville, N.C. USA. Nose wheel fork. Ref: NTSB file 3-3621.
G94	Piper PA-24 Commanche	10 Dec 64	0	S	Philadelphia, Pa. USA. Nose gear drag link clevis (threads). Ref: NTSB file 3-3630.
G95	Douglas DC-8 (Eastern)	8 Jan 65	0	S	San Juan, Puerto Rico. Right main landing gear axle beam. Service hours: 8943. Ref: NTSB file 1-0034.
G96	Beech M-23 Musketeer	10 Jan 65	0	S	Lombard, Ill. USA. Right landing gear strut. Ref: NTSB file 3-0402
G97	Piper PA-23 Aztec	13 Jan 65	0	S	Wilkesboro, N.C. USA. Lower nose wheel drag link. Ref: NTSB file 3-0196
G98	Cessna 310	18 Jan 65	0	S	Rochester, N.Y. USA. Nose gear lock torque tube. Ref: NTSB file 3-0112
G99	Cessna 140	24 Jan 65	0	S	Fort Lauderdale, Fla. USA. Left main gear axle. Ref: NTSB file 3-0093
G100	Cessna 172	25 Jan 65	0	S	Kansas City, Mo. USA. Nose wheel fork. Ref: NTSB file 3-0681.
G101	Mooney M-18L	30 Jan 65	0	S	Pacoima, Cal. USA. Right main gear operating arm (weld). Ref: NTSB file 3-0540.

G102	Curtiss C-46 (Zantop)	8 Feb 65	0	S	Atlanta, Ga. USA. Left landing gear. Ref: NTSB file 1-0015.
G103	Cessna 182G	17 Feb 65	0	S	Syracuse, N.Y. USA. Nose gear torque link. Ref: NTSB file 3-0427.
G104	Champion 7FC Tri-Traveler	21 Feb 65	0	S	Milton, Fla. USA. Nose gear fork. Ref: NTSB file 3-0673.
G105	Norseman V	26 Feb 65	0	S	Big Trout Lake, Ont. Canada. Left gear axle housing at lower end of shock strut. Ref: MOT Canada file 2497.
G106	Cessna 172A	13 Mar 65	0	S	Jacksonville, Ill. USA. Nose gear fork. Ref: NTSB file 3-0858.
G107	Cessna 172	26 Mar 65	0	S	San Antonio, Tex. USA. Nose wheel fork. Ref: NTSB file 3-2124.
G108	Cessna 195A	13 Apr 65	0	S	Madison, Wis. USA. Cross-wind wheel spindle pivot pin bolt (left gear). Ref: NTSB file 3-1926.
G109	Cessna 182	22 Apr 65	0	S	Butte, Mont. USA. Nose wheel fork. Ref: NTSB file 3-3614.
G110	Cessna 180	7 May 65	0	S	Tuktoyaktuk, NWT. Canada. Left spring leg at upper axle attachment holes. Ref: MOT Canada file 2542.
G111	Piper PA-22	8 May 65	0	S	Paducah, Ky. USA. Nose gear support tubes. Ref: NTSB file 3-0790.
G112	Boeing 707-120 (American)	11 May 65	0	S	El Paso, Tex. USA. No. 7 wheel, axle failed at brake journal. Ref: NTSB file 1-0018.
G113	Cessna 182B	13 May 65	0	S	Northbrook, Ill. USA. Nose wheel fork. Ref: NTSB file 3-1071.
G114	Morrisey 2150A	19 May 65	0	S	Gainesville, Ga. USA. Left gear scissor attach bracket. Ref: NTSB file 3-1099.
G115	Cessna 182	22 Jun 65	0	S	Slocum, R.I. USA. Nose gear fork. Ref: NTSB file 3-2191.
G116	Maule M-4	3 Jul 65	0	S	Moorpark, Cal. USA. Right center shock strut. Ref: NTSB file 3-2728
G117	Cessna 150	6 Jul 65	0	S	Whitehouse, N.J. USA. Nose gear fork. Ref: NTSB file 3-2245.
G118	Piper PA-23 Aztec	13 Jul 65	0	S	Renesselaer, Ind. USA. Nose gear turning stop broken. NTSB file 3-2400.

G119	Beech B35 Bonanza	14 Jul 65	0	S	Carnegie, Okla. USA. Lower nose gear drag leg bolt. NTSB file 3-2024.
G120	Cessna 182E	15 Jul 65	0	S	Kansas City, Mo. USA. Nose gear fork. Ref: NTSB file 3-2107.
G121	Douglas DC-6A (United)	15 Aug 65	0	S	Boston, Mass. USA. Nose gear scissor torque link. NTSB file 1-0043
G122	Piper PA-28 Cherokee	18 Aug 65	0	S	Culver, Ind. USA. Nose gear strut. Ref: NTSB file 3-2456.
G123	Maule M-4	21 Aug 65	0	S	Columbus, Ohio. USA. Right landing gear shock strut. NTSB file 3-2356.
G124	Cessna 182A	23 Aug 65	0	S	Dravosburg, Pa. USA. Nose gear fork. Ref: NTSB file 3-2463.
G125	Curtiss C-46F (Zantop)	31 Aug 65	0	S	Atlanta, Ga. USA. Gear collapsed. Improperly fabricated hose, wrong bolt. Ref: NTSB file 1-0045.
G126	Stinson 108-2	1 Sep 65	0	S	Huron, S.Dak. USA. Tail wheel attach tubing structure. Ref: NTSB file 3-3180.
G127	Aeronca 7AC Champion	7 Sep 65	0	S	Ronan, Mont. USA. Landing gear stuffing box (improper weld). Ref: NTSB file 3-3479.
G128	Beech 35-33 Bonanza	9 Sep 65	0	S	Omaha, Neb. USA. Nose gear hydraulic actuating cylinder shaft. Ref: NTSB file 3-3184.
G129	Mooney M-20A	23 Sep 65	0	S	West Carrollton, Ohio. USA. Tubular spacer between nose gear actuator rod bellcrank and gear retraction rod bellcrank. Ref: NTSB file 3-2931.
G130	Stinson 108-1	28 Sep 65	0	S	Grand Rapids, Mich. USA. Tail wheel spring assembly. NTSB file 3-2835.
G131	Great Lakes 2T-1E	30 Sep 65	0	S	Spokane, Wash. USA. Right main gear. Ref: NTSB file 3-3484.
G132	Beechcraft C-45H	1 Oct 65	0	S	Killeen, Tex. USA. Landing-gear rocker arm switch. NTSB file 3-3792.
G133	Cessna 310C	6 Oct 65	0	S	Pasco, Wash. USA. Right main gear oleo strut. NTSB file 3-3496.
G134	Cessna 150	16 Oct 65	0	S	West Chester, Pa. USA. Left gear spring assembly. NTSB file 3-2986.

G135	Meyers 200A	23 Oct 65	0	S	Hawthorne, Cal. USA. Left gear lower torque link and down lock link. Ref: NTSB file 3-3840.
G136	Piper J-3C	24 Oct 65	0	S	Lake Thonotosas, Fla. USA. Right float (vertical strut ball fitting). Ref: NTSB file 3-3121.
G137	Bellanca 14-13	31 Oct 65	0	S	Somerset, Pa. USA. Left landing gear retract strut. NTSB file 3-3440
G138	Mooney M-20E	1 Nov 65	0	S	Shreveport, La. USA. Nose gear shock absorber. Ref: NTSB file 3-3069
G139	N. American P-51D Mustang	4 Nov 65	0	S	Santa Monica, Cal. USA. Tailwheel turnbuckle shaft. NTSB file 3-3897.
G140	Taylorcraft BC-12D1	7 Nov 65	0	S	Westerly, R.I. USA. Tube brace strut, left main gear (weld repair). Ref: NTSB file 3-3241.
G141	Aero Commander 520	8 Nov 65	0	S	Minneapolis, Minn. USA. Down lock and retract assembly. NTSB file 3-3882.
G142	Cessna 172	13 Nov 65	0	S	College Park, Md. USA. Nose gear attach fitting. Ref: NTSB file 3-3221
G143	Aero Commander 520	17 Nov 65	0	S	Oklahoma City, Okla. USA. Right main wheel axle. NTSB file 3-3390.
G144	Cessna 182	23 Nov 65	0	S	Rolette, N.D. USA. Nose gear fork casting. Ref: NTSB file 3-4006.
G145	Mooney M-20C	28 Nov 65	0	S	Denver, Colo. USA. Nose gear retract truss assembly. Ref: NTSB file 3-3585.
G146	Cessna 180	29 Nov 65	0	S	Fort McMurray, Alta. Canada. Right leg (top front bolt hole). Ref: MoT Canada file 2786.
G147	Cessna 172	11 Dec 65	0	S	Gaithersburg, Md. USA. Nose gear fork. Ref: NTSB file 3-3721.
G148	Cessna 150E	14 Dec 65	0	S	Ronkonkoma, N.Y. USA. Nose gear steering tube assembly rod end bearing. Ref: NTSB file 3-3530.
G149	Beech 23 Musketeer	14 Dec 65	0	S	Knoxville, Tenn. USA. Right gear at wing attach plate (improperly fastened attach screws). Ref: NTSB file 3-3665.
G150	Cessna 320	18 Dec 65	0	S	Teterboro, N.J. USA. Nose wheel drive tube. Ref: NTSB file 3-3650.

G151	Cessna 182	19 Dec 65	0	S	Pontiac, Mich. USA. Nose gear fork. Ref: NTSB file 3-3595.
G152	Cessna 310C	22 Dec 65	0	S	Memphis, Tenn. USA. Nose gear main drive tube assembly. Ref: NTSB file 3-3734.
G153	Mooney M-20A	2 Jan 66	0	S	Goodland, Kans. USA. Weld on spacers of clevis fittings on lateral torque rod failed. Ref: NTSB file 3-0569.
G154	Beech 23 Musketeer	8 Jan 66	0	S	Joliet, Ill. USA. Right main landing gear. Ref: NTSB file 3-0192.
G155	Cessna 180	14 Jan 66	0	S	Reno, Nev. USA. Tail wheel steering mechanism. NTSB file 3-0237
G156	Piper PA-22	13 Feb 66	0	S	Flint, Mich. USA. Nose gear mount. Ref: NTSB file 3-0216.
G157	Cessna 150	17 Feb 66	0	S	Hot Springs, Ark. USA. Nose gear mounting bracket. NTSB file 3-0290.
G158	Piper PA-23 Aztec	19 Feb 66	0	S	East St. Louis, Ill. USA. Nose gear retract strut. Ref: NTSB file 3-1807.
G159	Stinson 108-1	20 Feb 66	0	S	Shirley, Mass. USA. Right main gear hinge pin. NTSB file 3-0463
G160	Cessna 210	22 Feb 66	0	S	Lafayette, La. USA. Left main gear actuator spindle shaft. Ref: NTSB file 3-0377.
G161	Temco D-16A	16 Mar 66	0	S	Jackson, Miss. USA. Nose gear collar attaching retract rods. Ref: NTSB file 3-0641.
G162	Beech C-45G	23 Mar 66	0	S	Kanapali, Hawaii. USA. Nose gear attach points. Ref: NTSB file 3-0648.
G163	Aero Commander 520	28 Mar 66	0	S	Muskogee, Okla. USA. Nose gear body assembly. Ref: NTSB file 3-1124.
G164	Piper J-3C	2 Apr 66	0	S	Vicksburg, Miss. USA. Right main gear strut. Ref: NTSB file 3-0658.
G165	Beech B50 Twin Bonanza	6 Apr 66	0	S	Jackson, Miss. USA. Nose gear jack screw mounting. NTSB file 3-0616.
G166	Mooney M-20	16 Apr 66	0	S	Kingman, Kans. USA. Nose gear struts (welds). Ref: NTSB file 3-2162
G167	Cessna 180B	21 Apr 66	0	S	Whitehorse, Y.T. Canada. Right gear leg (top axle attachment holes). Ref: MoT Canada file 2898.

G168	Norseman 6	23 Apr 66	0	S	Bowden Lake, Man. Canada. Right gear shock strut stub leg (cracks in weld repair). Ref: MoT Canada file 2924.
G169	Piper PA-18 Super Cub	23 Apr 66	0	S	Tyonek, Alas. USA. Landing gear: ski assembly. NTSB file 3-1573.
G170	Grumman G-164 AgCat	29 Apr 66	0	S	Abbeville, La. USA. Main landing gear. Ref: NTSB file 3-1574.
G171	Cessna 310	29 Apr 66	0	S	Concord, Cal. USA. Nose gear bell crank. Ref: NTSB file 3-0882.
G172	Bellanca 14-13	7 May 66	0	S	Tony, Wis. USA. Welded fitting in right gear screw shaft assembly. Ref: NTSB file 3-1084.
G173	Piper PA-24 Commanche	26 May 66	0	S	Salem, Ore. USA. Nose gear push-pull rod (thread at inboard end). Ref: NTSB file 3-1121.
G174	Piper PA-22	18 Jun 66	0	S	Ronkonkoma, N.Y. USA. Main landing gear. Ref: NTSB file 3-1523.
G175	Cessna 172	21 Jun 66	0	S	High Point, N.C. USA. Nose wheel fork. Ref: NTSB file 3-1533.
G176	Cessna 180	23 Jun 66	0	S	Prince George, B.C. Canada. Right wheel brake disc retaining clips. Ref: MoT Canada file 2995.
G177	Cessna 182C	2 Jul 66	0	S	Hyannis, Mass. USA. Nose wheel fork. Ref: NTSB file 3-3208.
G178	Lockheed L-188A Electra (Braniff)	21 Jul 66	0	S	Fort Worth, Tex. USA. Left main gear door actuating piston. Ref: NTSB file 1-0070.
G179	Luscombe 8A	22 Jul 66	0	S	Titusville, Fla. USA. Left landing gear drag brace bolt. Ref: NTSB file 3-1980.
G180	Helio H-391B Courier	2 Aug 66	0	S	Van Nuys, Cal. USA. Right strut failed. Flown extensively from rough fields. Ref: NTSB file 3-3106.
G181	Cessna 180A	3 Aug 66	0	S	Moberly Lake, B.C. Canada. Right gear leg immediately above axle upper attachment bolt holes. (Fretting). Ref: MoT Canada file 3071.
G182	Piper PA-18 Super Cub	4 Aug 66	0	S	Gakona, Alas. USA. Left axle shaft separated. Flown extensively from rough strips. Ref: NTSB file 3-3506.

G183	Navion B	12 Aug 66	0	S	Bakersfield, Cal. USA. Nose gear trunnion unit (weld). NTSB file 3-2866.
G184	Cessna 310F	13 Aug 66	0	S	Chantilly, Va. USA. Nose gear actuating rod. Ref: NTSB file 3-2029.
G185	Sud Aviation SE-210 Caravelle (United)	22 Aug 66	0	S	Newark, N.J. USA. Nose wheel axle spindle (improperly shot-peened). Ref: NTSB file 1-0053.
G186	Cessna 182A	3 Sep 66	0	S	Pottstown, Pa. USA. Nose gear shimmy dampener arm and nose wheel fork failed. Ref: NTSB file 3-2340.
G187	Cessna 180	6 Sep 66	0	S	Tarentum, Pa. USA. Left gear attach bolt. Ref: NTSB file 2-0784.
G188	Grumman G-164 AgCat	8 Sep 66	0	S	McAdoo, Tex. USA. Left gear at fuselage attach point. Ref: NTSB file 3-2527.
G189	Piper PA-30 Twin Commanche	14 Sep 66	0	S	Louisville, Ky. USA. Ball joint end of landing gear actuating conduit pin (threads). Ref: NTSB file 3-2156.
G190	Cessna 310H	27 Sep 66	0	S	Purchase, N.Y. USA. Uplock torque tube (nose gear). NTSB file 3-3885.
G191	Cessna 182A	28 Sep 66	0	S	Cairo, Ga. USA. Nose wheel shimmy dampener. NTSB file 3-3134.
G192	Cessna 182E	10 Oct 66	0	S	Nashville, Tenn. USA. Nose gear fork at strut attachment. Ref: NTSB file 3-2664.
G193	Cessna 170B	13 Oct 66	0	S	Shelby, Miss. USA. Right main wheel axle separated at radius of axle to flange mount. Ref: NTSB file 3-2581.
G194	Aero Commander 520	14 Oct 66	0	S	Houma, La. USA. Nose wheel fork (bolt holes). NTSB file 3-3155.
G195	Cessna 210	17 Dec 66	0	S	Newburyport, Mass. USA. Left main landing gear actuator assembly spindle. Ref: NTSB file 3-4351.
G196	Piper PA-28 Cherokee	16 Jan 67	0	S	Pasadena, Md. USA. Nose wheel strut mount adjacent to weld. Ref: NTSB file 3-0169.
G197	Cessna 182E	18 Jan 67	0	S	Vichy, Mo. USA. Nose wheel fork. NTSB file 3-0205.
G198	Cessna 182	31 Jan 67	0	S	Helena, Mont. USA. Nosewheel fork. Ref: NTSB file 3-0294.

G199	Douglas DC-6B (Northeast)	22 Feb 67	0	S	Martha's Vineyard, Mass. USA. Left landing gear strut piston. NTSB file 1-0012.
G200	D.H. 114 Heron 1B	25 Feb 67	0	S	Montego Bay, Jamaica. Left axle plug, nose gear. Ref: Jamaica
G201	Beech D50 Twin Bonanza	15 Mar 67	0	S	Birmingham, Ala. USA. Nose gear shimmy damper jammed, failed nose gear. Ref: NTSB file 3-0870.
G202	Cessna 150	19 Mar 67	0	S	Blytheville, Ark. USA. Left trunnion bolt. Ref: NTSB file 3-0891.
G203	Mooney M-20	21 Mar 67	0	S	Minden, Nev. USA. Landing gear lever bell cranks in attach welds. Ref: NTSB file 3-0983.
G204	Fleet 80 Canuck (skis)	24 Mar 67	0	S	Wawa, Ont. Canada. Left undercarriage axle at machine mark. Ref: MoT Canada file 3329.
G205	Stinson 108-1	9 Apr 67	0	S	Brookhaven, N.Y. USA. Tubular member attached to tailwheel and fuselage failed. Ref: NTSB file 3-1148.
G206	Cessna 180	16 Apr 67	0	S	Monticello, Ut. USA. Tail wheel spring. NTSB file 3-1223.
G207	Cessna 180F (ski-wheel)	17 Apr 67	0	S	Twin Falls, Labrador. Canada. Right gear leg at upper forward wheel attachment bolt hole. Ref: MoT Canada file 3349.
G208	Cessna 182	23 Apr 67	0	S	Millville, N.J. USA. Nose wheel fork. Ref: NTSB file 3-1373.
G209	Piper PA-22	20 May 67	0	S	Lexington, Mo. USA. Left landing gear forward and rear vee tubes. Ref: NTSB file 3-1721.
G210	Stinson V-77	20 May 67	0	S	Lincoln, R.I. USA. Left landing gear oleo piston rod. Ref: NTSB file 3-2300.
G211	Cessna 140	30 May 67	0	S	North Kingstown, R.I. USA. Left landing gear. Ref: NTSB file 3-2393.
G212	Beech J35 Bonanza	31 May 67	0	S	Lufkin, Tex. USA. Nose gear push-pull rod end (threaded area). Ref: NTSB file 3-1962.
G213	Vickers 745D Viscount (United)	26 Jun 67	0	S	Grand Rapids, Mich. USA. Nose wheel pivot pin (lubrication holes). Ref: NTSB file 1-0036.

G214	Cessna 182E	29 Jun 67	0	S	Teterboro, N.J. USA. Landing gear: nose wheel assemblies. Ref: NTSB file 3-2254.
G215	Cessna 140A	1 Jul 67	0	S	North Canton, Ohio. USA. Left gear (bolt hole at step attach point). Ref: NTSB file 3-2165.
G216	Cessna 170	22 Jul 67	0	S	Miltonvale, Kans. USA. Left landing gear axle. Ref: NTSB file 3-2516.
G217	de Havilland DHC-3 Otter	6 Aug 67	0	S	Cape Sparbo, NWT. Canada. Main gear attachment bolt. Ref: MoT Canada file 3559.
G218	Stits SA3B	2 Sep 67	0	S	Owatonna, Minn. USA. Failure of pedal torque tube attached to nose steering broken welds on brace tubes from engine mount to gear. Ref: NTSB file 3-3732.
G219	Cessna 120	6 Sep 67	0	S	Pekin, Ill. USA. Left gear at bolt hole holding step. Ref: NTSB file 3-4749.
G220	Cessna 172	14 Oct 67	0	S	Salem, Ind. USA. Nose wheel fork. Ref: NTSB file 3-4001.
G221	Bellanca 14-193	21 Oct 67	0	S	Kenner, La. USA. Right upper strut of nose gear assembly. Ref: NTSB file 3-3776.
G222	Cessna 195	3 Nov 67	0	S	Arcata, Cal. USA. Main gear. Origin: drilled hole, right strut. NTSB file 3-3817.
G223	Beech A35 Bonanza	19 Nov 67	0	S	Visalia, Cal. USA. Nose gear actuator retract arm. NTSB file 3-4167
G224	Vickers 745D Viscount (United)	28 Nov 67	0	S	Raleigh-Durham, N.C. USA. Valve body of nose wheel steering jack twin relief valve. Ref: NTSB file 1-0058.
G225	Cessna 182A	29 Nov 67	0	S	El Paso, Tex. USA. Nose wheel fork. Ref: NTSB file 3-4183.
G226	Cessna 182	12 Dec 67	0	S	Jefferson, Ga. USA. Nose wheel shimmy dampener attach bracket. Ref: NTSB file 3-4741.
G227	Cessna 175	15 Jan 68	0	S	Williams Lake, B.C. Canada. Nose wheel fork at fork attachment bolt lug fillets. Ref: MoT Canada file 3729.

G228	Cessna 180	25 Feb 68	0	S	Peace River Airport, Alta. Canada. Tail wheel torque tube at forward bolt holes inside servo casting. Ref: MoT Canada file 3778
G229	Cessna 210	25 Feb 68	0	S	Howell, Mich. USA. Nose wheel fork. Ref: NTSB file 3-0328.
G230	Douglas A-26 Invader	16 Mar 68	0	S	Kansas City, Kans. USA. Right gear trunnion pivot fittings. Ref: NTSB file 3-0830.
G231	Douglas DC-3C	3 May 68	0	S	Jacksonville, Fla. USA. Bearing bolt, left landing gear. NTSB file 3-4490
G232	Grumman G-164 AgCat	8 May 68	0	S	Elton, La. USA. Left main gear. Ref: NTSB file 3-1213.
G233	Cessna 150	14 May 68	0	S	Jacksonville, Ark. USA. 2 broken diagonal members holding upper nose gear retaining collar in place. Ref: NTSB file 3-2018.
G234	Cessna 150	15 May 68	0	D	Montgomery, Ala. USA. Nose wheel fork. Ref: NTSB file 3-1393.
G235	Douglas DC-4 (Ansett-ANA)	26 Jun 68	0	S	Launcestron, Australia. Bolt attaching lower torque link to nose-wheel fork. Ref: WAAS p. 11/68 & Australia DoT
G236	Luscombe 8A	13 Jul 68	0	S	Longwood, Fla. USA. Left gear jack strut attach bolt. Ref: NTSB file 3-4086.
G237	Cessna 310	30 Aug 68	0	S	Pittstown, N.J. USA. Torque tube assembly at LH bearing assembly. Ref: NTSB file 3-3011.
G238	Piper PA-28 Cherokee	22 Sep 68	0	S	Canandaigua, N.Y. USA. Nose gear shock strut piston. NTSB file 3-3639.
G239	Cessna 182A	29 Sep 68	0	S	Mill Creek, Okla. USA. Nose gear fork had cracks at strut attach bolt. Ref: NTSB file 3-3157.
G240	Globe GC-1B	12 Oct 68	0	S	Washburn, Iowa, USA. Right gear actuating arm. NTSB file 3-3259.
G241	American AA-1 Yankee	21 Nov 68	0	S	Bayport, N.Y. USA. Nose gear strut above fork attach point. Ref: NTSB file 3-4345.
G242	Beech E18S	20 Dec 68	0	S	Los Angeles, Cal. USA. Attach screw to push rod assembly. Ref: NTSB file 3-4635.

G243	Cessna 310B-A1	1969	0	S	Bankstown, NSW, Australia. Right main gear actuator tube (inboard rivet line). Previous buckling. Ref: Australia DoT.
G244	Cessna 210B	1969	0	S	Cudal, NSW, Australia. Port leg (saddle failed). Ref: Australia DoT
G245	Cessna A188	1969	0	S	Byabarra, NSW, Australia. Port spring leg at attachment to fuselage fitting. Ref: Australia DoT.
G246	Travel Air D4000	20 Jan 69	0	S	Tallulah, La. USA. Right main gear separated at fuselage. Ref: NTSB file 3-1661.
G247	Beech E18S	5 Feb 69	0	S	La Crosse, Wis. USA. Landing gear slide tube. Ref: NTSB file 3-0030.
G248	Cessna 150E	10 Feb 69	0	S	Johnson, Kans. USA. Landing gear, nosewheel assemblies. Commonly used on rough strips. Ref: NTSB file 3-0517.
G249	Piper PA-23 Aztec	5 Mar 69	0	S	Lake Wales, Fla. USA. Rear tube of drag brace assembly (nose wheel). Ref: NTSB file 3-1854.
G250	Beech C-45G	21 Mar 69	0	S	Fort Lauderdale, Fla. USA. Nose gear fork. Ref: NTSB file 3-0409.
G251	Piper PA-23 Aztec	21 Mar 69	0	S	Jacksonville, Fla. USA. Nose gear upper drag link. NTSB file E-0007.
G252	Cessna 195	25 Apr 69	0	S	Keene, N.H. USA. Right landing gear. Ref: NTSB file 3-1405.
G253	Beech G18S	5 May 69	0	S	Tulsa, Okla. USA. Right main gear drag leg (weld). NTSB file 3-2148
G254	Beech 23 Musketeer	16 May 69	0	S	Colts Neck, N.J. USA. Main landing gear. Ref: NTSB file 3-1837.
G255	Erco 415-C Ercoupe	29 Jun 69	0	S	Bradford, Pa. USA. Nose wheel steering ball joint fitting. Ref: NTSB file 3-2964.
G256	Convair 990 (American)	29 Jul 69	0	S	Fort Worth, Tex. USA. Landing gear support beam. NTSB file 1-0053.
G257	Convair 600 (Texas Intl)	1 Aug 69	0	S	Houston, Tex. USA. Nose gear retract cylinder rod. NTSB file 1-0037.
G258	Cessna 150	23 Aug 69	0	S	San Bernardino, Cal. USA. Landing gear (nosewheel assemblies). Ref: NTSB file 3-3580.

G259	Boeing E75 Stearman	5 Sep 69	0	S	Orange, Tex. USA. Right gear. Ref: NTSB file 3-3898.
G260	Douglas DC-8 (Delta)	17 Sep 69	0	S	Dallas, Tex. USA. Landing gear lower lug of forward bogie beam. Ref: NTSB file 1-0056.
G261	Cessna 140	24 Oct 69	0	S	Flint, Mich. USA. Right gear at step assembly attach point. Ref: NTSB file 3-4291.
G262	Cessna 195	13 Nov 69	0	S	Nashville, Tenn. USA. Left gear (wedges on outboard side of fuselage gear saddle). Ref: NTSB file 3-4438.
G263	Cessna 140	17 Dec 69	0	S	Sand Springs, Okla. USA. Left wheel fell off (broken axle). Ref: NTSB file 3-4536.
G264	Cessna A188	1970	0	S	Newrybar, NSW, Australia. Right gear leg fractured. Ref: Australia DoT.
G265	Transavia PL-12 Airtruk	1970	0	S	Narrabri, NSW, Australia. Nose landing gear strut. Ref: Australia DoT.
G266	Beech E50 Twin Bonanza	1970	0	S	Katherine NT, Australia. Nose gear retract mechanism. Ref: Australia.
G267	Cropmaster YA1-25	1970	0	S	Cudgewa Vic., Australia. Main gear strut plunger. Ref: Australia DoT.
G268	Piper PA 25-150 Pawnee	1970	0	S	Marlborough Qld., Australia. Undercarriage V-brace. Ref: Australia DoT
G269	Cessna 185A	1970	0	S	Moora, W.A., Australia. Port undercarriage main leg. Ref: Australia DoT
G270	Cessna 180 (skis)	9 Feb 70	0	S	Bathurst Inlet, NWT. Canada. Left gear leg at wheel axle upper attachment bolt hole. Ref: MOT Canada file W0007.
G271	Cessna 190	25 Feb 70	0	S	Lewiston, Id. USA. Main gear assembly. Ref: NTSB file 3-1059.
G272	Cessna 120	2 Mar 70	0	S	Gaithersburg, Md. USA. Right landing gear support bracket. Ref: NTSB file 3-0467.
G273	Cessna 150G	23 Mar 70	0	S	Archer, Fla. USA. Nosewheel strut support tubes. NTSB file 3-0748.
G274	Ted Smith Aerostar 600	1 Apr 70	0	S	Bedford, Pa. USA. Main landing gear piston. Cracks formed during heat treatment process. Ref: NTSB file 3-0767

G275	Cessna 402	22 Apr 70	0	S	Pembina, N.Dak. USA. Left main landing gear torque arm attach lug. Ref: NTSB file E-0001.
G276	Cessna 180A (ski/wheels)	23 Apr 70	0	S	Inuvik, NWT. Canada. Right gear leg at axle attachment upper bolt holes. Ref: MOT Canada file W0021.
G277	Canadair CL-44J (Icelandic)	30 Apr 70	0	S	New York, N.Y. USA. Mounting lug of left main gear actuating mounting bracket (at bolt hole). Ref: Iceland.
G278	Cessna 172	28 Jun 70	0	S	Lodi, Cal. USA. Nose wheel fork at sides of strut attach point. Ref: NTSB file 3-1235.
G279	Champion 7ECA	6 Aug 70	0	S	West Chester, Pa. USA. Left main gear attach bolt. Ref: NTSB file 3-3287.
G280	Boeing 727 (Pan American)	28 Sep 70	0	S	Las Mercedes Airport, Managua, Nicaragua. Rear support of actuating link, left-gear door. Ref: WAAS p. 25/70.
G281	Beech E18S	3 Oct 70	0	S	Anniston, Ala. USA. Landing gear support assembly. NTSB file 3-4611.
G282	Boeing 727 (National)	4 Nov 70	0	S	Savannah, Ga. USA. Right main landing gear aft trunnion support beam. Ref: NTSB file 1-0040.
G283	Douglas DC-6B	5 Nov 70	0	D	Kerkyra, Greece. Upper torque link of nose gear. Ref: ICAO ADREP 357/70.
G284	Cessna 120	8 Nov 70	0	S	Lowell, Mich. USA. Right axle. Ref: NTSB file 3-4139.
G285	Cessna 180	11 Nov 70	0	S	Nantucket, Mass. USA. Left wheel attach bolts. Ref: NTSB file 3-4155.
G286	Consolidated 28-5AC PBY Catalina	14 Nov 70	0	S	Christiansted, Vi. USA. Left main gear hydraulic actuator. Ref: NTSB file 3-1708.
G287	Champion 7ECA	18 Nov 70	0	S	Dayton, Ohio. USA. Right axle at strut attach mounting pad. Ref: NTSB file 3-4200.
G288	Beech 23 Musketeer	24 Nov 70	0	S	Davenport, Iowa. USA. Right main landing gear housing. NTSB file 3-4224
G289	Cessna 185	26 Nov 70	0	S	Glenallen, Alas. USA. Right gear strut spring. NTSB file 3-4245.

G290	Champion 7ECA	28 Nov 70	0	S	Santa Ana, Cal. USA. Left main gear attach bolt. NTSB file 3-4289.
G291	Boeing 727 (Continental)	16 Dec 70	0	S	Burbank, Cal. USA. Left main landing gear trunnion beam at bearing hole. Ref: NTSB file 1-0047.
G292	Douglas DC-6B	19 Dec 70	0	S	Malaga, Spain. Attachment fitting securing the recovery spring cable to lower end of left landing gear leg. Ref: Belgium AA.
G293	Convair 580 (Frontier)	23 Dec 70	0	S	Kansas City, Mo. USA. Left main landing gear inboard strut outer cylinder. Ref: NTSB file 1-0044.
G294	Vought A-7 Corsair II (USAF)	1971	1	?	? Nose gear failed during catapult launch. Crack in landing gear strut. Ref: AWST 29 Nov/71 p 22
G295	Vought A-7 Corsair II (USAF)	1971	0	?	? Nose gear failed during catapult launch. Crack in landing gear strut. Ref: AWST 29 Nov/71 p 22
G296	Cessna 188A	1971	0	S	Tumut, NSW, Australia. Left gear collapsed. Ref: Australia DoT.
G297	Cessna A188	1971	0	S	Goulbourn, NSW, Australia. Inboard attach bolt of right gear. Ref: Australia DoT.
G298	Cessna 210B	1971	0	S	Cudal, NSW, Australia. Actuator spindle (right gear). Ref: Australia.
G299	Cessna 185A	1971	0	S	Geraldton, WA, Australia. Cross tube of tailwheel. Ref: Australia DoT.
G300	Cessna 185	1971	0	S	Geraldton, WA, Australia. Nosewheel on port float (faulty bolt). Ref: Australia DoT.
G301	Beech 95-C55 Baron	1971	0	S	Dampier WA, Australia. Nose gear, plunger rod assembly (fork end bolt holes). Ref: Australia DoT.
G302	Grumman 164A AgCat	1971	0	S	Dayboro, Qld. Australia. Gear collapsed. Ref: Australia.
G303	Mooney M-21	14 Feb 71	0	S	North Shore, Cal. USA. Actuating lever (weld). Ref: NTSB file 3-0830.
G304	Boeing 727 (American)	26 Feb 71	0	S	St. Louis, Mo. USA. Left gear trunnion support beam (attach hole). Ref: NTSB file 1-0031.

G305	Cessna 170A	4 Mar 71	0	S	Leclaire, Iowa. USA. Right wheel axle. Ref: NTSB file 3-0824.
G306	Cessna 185	12 Mar 71	0	S	Tasman Glacier, New Zealand. Port gear leg (axle attachment). Ref: NZ 71-027
G307	Champion 7GCBC	23 May 71	0	S	Elsinore, Cal. USA. Left main landing gear attach bolt. Ref: NTSB file 3-1708.
G308	Beech 35 Bonanza	20 Jun 71	0	S	Golts, Md. USA. Nose wheel fork (weld). Ref: NTSB file 3-1181.
G309	Stinson L-5G	27 Jun 71	0	S	Murfreesboro, Tenn. USA. Tail wheel (old crack). Ref: NTSB file 3-1811.
G310	Beech A23 Musketeer	3 Jul 71	0	S	Joliet, Ill. USA. Right gear casting. Ref: NTSB file 3-2664.
G311	Grumman G-164 AgCat	14 Aug 71	0	S	Buttonwillow, Cal. USA. Left gear leg. Ref: NTSB file 3-3011.
G312	Grumman G-164 AgCat	17 Aug 71	0	S	Davis, Cal. USA. Main landing gear. Ref: NTSB file 3-3099.
G313	Bolkow 208	29 Aug 71	0	S	Rotorua Airport, New Zealand. Nose leg outer tube. Ref: NZ brief 71-079.
G314	Piper PA-32 Cherokee SIX	15 Sep 71	0	S	Boonville, Mo. USA. Axle of right gear (tool mark). Ref: NTSB file 3-3718.
G315	Piper PA-18 Super Cub	20 Sep 71	0	S	Chitina, Alas. USA. Left axle. Ref: NTSB file 3-3809.
G316	Commonwealth 185	20 Sep 71	0	S	Mesa, Ariz. USA. Right landing gear tube. Ref: NTSB file 3-3815
G317	Transavia PL-12 Airtruk	1972	0	S	Mudee, NSW, Australia. Port landing gear, inner pivot attach lug. Ref: Australia DoT.
G318	Transavia PL-12 Airtruk	1972	0	S	Omeo, Vict. Australia. Nose gear at weld. Ref: Australia DoT
G319	Cessna 210-5	1972	0	S	Surfers Gardens, Qld. Australia. Attachment bolt, right spring leg (wrong nut). Ref: Australia DoT.
G320	Piper PA 25-150 Pawnee	1972	0	S	Kingaroy Qld., Australia. Brace tube, left main gear. Ref: Australia DoT.
G321	Champion 7GCAA	3 Mar 72	0	S	Edgefield, S.C. USA. Left gear (attach bolt). Ref: NTSB file 3-0662

G322	de Havilland DH-104 Dove	14 Mar 72	0	S	San Juan, Puerto Rico. Left gear actuating piston. NTSB file 3-1422.
G323	Piper PA-28-140 Cherokee	1 May 72	0	S	St. Hubert, Que. Canada. Right gear lower torque link (scissor). AD not complied with. Ref: MOT Canada file Q20040.
G324	Convair 600 (Texas Intl)	8 May 72	0	S	Alexandria, La. USA. Nose gear piston rod. Ref: NTSB file 1-0015.
G325	Piper PA-28-140B Cherokee	12 May 72	0	S	St. Hubert, Que. Canada. Right gear upper torque link (AD not complied with). Ref: MOT Canada file Q20039.
G326	Cessna 182F	31 May 72	0	S	Logansport, Ind. USA. Left gear strut. Origin: fretting corrosion. Ref: NTSB file 3-0173.
G327	Cessna 180	10 Jun 72	0	S	Menomonee Falls, Wis. USA. Main gear (fretting). Ref: NTSB file 3-2371.
G328	Douglas DC-3 (Ansett Airlines Papua)	12 Jul 72	0	S	Wapenamanda, Papua, New Guinea. Starboard gear Y fitting (bolt hole). Ref: WAAS p. 22/72.
G329	Cessna 170	17 Jul 72	0	S	Chugiak, Alas. USA. Landing gear. Ref: NTSB file 3-2486.
G330	Aeronca 11AC Super Chief	18 Jul 72	0	S	Two Harbors, Minn. USA. Left front landing gear fitting lug (bolt holes). Ref: NTSB file 3-2414.
G331	Cessna TU206B	22 Jul 72	0	D	Lone Pine, Calif. USA. Nose gear steering collar. NTSB file 3-3427
G332	Aero Commander Snow	3 Aug 72	0	S	Cashmore Airstrip Kinleith, New Zealand. AN9-52 bolt, linking upper tripod to shock strut of right gear. Ref: NZ brief 72-071.
G333	de Havilland Comet 4 (Dan Air)	20 Aug 72	0	S	Salzburg, Austria. Nose wheel jack piston head. Ref: WAAS p 25/72
G334	N. American Sabreliner 40	28 Aug 72	0	S	Columbia, Mo. USA. Right gear outer cylinder. NTSB file 3-1440
G335	Boeing 727	1 Oct 72	0	S	San Francisco, Cal. USA. Stress corrosion and fatigue, front trunnion bearing support fitting. Ref: NTSB file 1-0044.
G336	Cessna 195	23 Oct 72	0	S	Santa Ana, Cal. USA. Gear collapsed. Ref: NTSB file 3-2906.
G337	Intermount A9A	1973	0	S	Bridgetown WA, Australia. Bottom shock strut terminal, port gear. Ref: Australia DoT.

G338	Champion 7GCAA Citabria	1973	0	S	Moorooduc Vic., Australia. Attach bolts, port gear. Ref: Australia DoT.
G339	Transavia PL-12 Airtruk	1973	0	S	Corryong, Vict., Australia. Nose gear support structure faulty. Ref: Australia DoT.
G340	Cessna 210A	1973	0	S	Groote Eylandt, NT, Australia. Shaft of spindle flange in port gear actuator.
G341	Cessna A188-A	1973	0	S	Geraldton, WA, Australia. Left mainwheel bolt. Ref: Australia DoT.
G342	Piper PA 18-150 Super Cub	1973	0	S	Camden NSW, Australia. Main gear strut to fuselage attach fitting. Ref: Australia DoT.
G343	Boeing 707-320	1973	0	S	Sydney NSW, Australia. Left main gear trunnion support rib (inboard flange rear fastener hole). Ref: Australia DoT
G344	Auster 3F	1973	0	S	South Marulan NSW, Australia. Radius rod, right gear. Ref: Australia DoT.
G345	Auster 3F	1973	0	S	Singleton NSW, Australia. Broken weld, stub axle fitting, right gear. Ref: Australia DoT.
G346	Piper PA 25-235 Pawnee	1973	0	S	Griffith NSW, Australia. Undercarriage main gear shock absorbing system. Ref: Australia DoT.
G347	Grumman G-164 AgCat	12 Mar 73	0	S	Hockley, Tex. USA. Landing gear. NTSB file 3-0407.
G348	Beech D18S	14 Mar 73	0	S	Oakland, Cal. USA. Right hand drive shaft support bracket of nose gear. Ref: NTSB file 3-0510.
G349	Lockheed 382G Hercules (Saturn Airways)	17 Mar 73	0	S	Pensacola, Fla. USA. Nose gear cylinder. Origin: stress-corrosion pits. Ref: NTSB file 1-0006.
G350	Boeing 707 (Pan Am)	9 Apr 73	0	S	Miami, Fla. USA. Nose gear outer cylinder. Origin: pre-existing stress corrosion crack. Ref: NTSB file 1-0010.
G351	Vickers Viscount (British Midland)	8 Jun 73	0	S	East Midlands, UK. Nose undercarriage support structure. Ref: WAAS p. 16/73.
G352	Convair 580 (U.S. Air)	12 Jun 73	0	S	Pittsburgh, Pa. USA. Nose gear upper left drag strut. Ref: NTSB file 1-0014.

G353	Socata 880B Rallye Club	17 Jul 73	0	S	Bad Duerkheim, W. Germany. Strut attachment of front gear leg. Ref: W. German file 3X0296.
G354	Sportavia RF4D Avion-Planeur	5 Aug 73	0	S	Vielbrunn, W. Germany. Landing gear. Ref: W. German file 3X0342.
G355	Beech 65-80 Queen Air	8 Aug 73	0	S	Chattanooga, Tenn. USA. Nose gear actuator assembly attach bolt. Ref: NTSB file 3-2205.
G356	Beech C-45H	17 Aug 73	0	S	Los Angeles, Cal. USA. Right brake froze due to worn brake puck, overstressed weakened right drag link of main gear. Ref: NTSB file 3-2902.
G357	Handley Page Herald (Br. Island)	4 Sep 73	0	S	Gatwick, UK. Front pressure bulkhead around nose gear downlock failed, allowing downlock catch to spring out. Ref: WAAS p. 26/73.
G358	Transavia PL-12 Airtruk	6 Sep 73	1	S	Swan Vale, N.S.W., Australia. Nosewheel steering pin. Ref: Australia DoT.
G359	Maule M-4-220C	23 Sep 73	0	S	Bethel, Alas. USA. Main gear. Ref: NTSB file 3-3757.
G360	Cessna 150E	27 Sep 73	0	S	Kirchheim-Teck, W. Germany. Main landing gear strut attachment (sharp notch). Ref: W. German file 3X0452.
G361	Luscombe 8A	4 Nov 73	0	S	Denton, Tex. USA. Front left landing gear attachment. Ref: NTSB file 3-3499.
G362	Cessna A188	20 Nov 73	0	S	Awatoitoi Station, New Zealand. Port gear leg at fuselage. Origin: fretting. Ref: NZ brief 73-139.
G363	Transavia PL-12 Airtruk	1974	0	S	Geraldton, WA, Australia. Right main wheel pivot bracket (weld). Ref: Australia DoT.
G364	Transavia PL-12 Airtruk	1974	0	S	Mudgee, NSW, Australia. Poor weld, nose strut to engine mount. Ref: Australia DoT.
G365	Cessna 180A	1974	0	S	Boulia, Qld, Australia. Right spring leg. Ref: Australia DoT.
G366	Piper PA 25-235 Pawnee	1974	0	S	Oberon NSW, Australia. Left gear front attachment (poor weld). Ref: Australia DoT.
G367	Beech H35 Bonanza	6 Jan 74	0	S	Canyon, Tex. USA. Nose gear brace assembly. Ref: NTSB file 3-0231.

G368	Piper PA-28 Cherokee	14 Feb 74	0	S	Sanford, Fla. USA. 2 lugs on main-gear cylinder. NTSB file 3-0281.
G369	Piper PA-18 Super Cub	3 Mar 74	0	S	Shungnak, Alas. USA. Crack in right gear. Ref: NTSB file 3-0291.
G370	Aerospatiale Caravelle 10B3	15 Mar 74	16	D	Tehran, Iran. Attachment fitting of main undercarriage. Ref: Denmark Dept. of Accident Investigation
G371	Cessna F172	4 Apr 74	0	S	Iisalmi, Finland. Torque link bolt of ski nose landing gear. Ref: Finland BoA.
G372	Maule M-4-210C	14 Apr 74	0	S	Aalen-Heidenheim, W. Germany. Tail landing gear. Ref: W. German file 3X0074.
G373	Piper PA-23 Aztec	16 Apr 74	0	S	Opa Locka, Fla. USA. Upper drag link, nose gear. NTSB file 3-1027.
G374	Piper PA-20 Pacer	26 Apr 74	0	S	Waterloo, Iowa. USA. Tailwheel mounting bolt. Ref: NTSB file 3-0984.
G375	Cessna A188B	30 Apr 74	0	S	Arcadia, Fla. USA. Left main gear spring retention bolt. Ref: NTSB file 3-2189.
G376	Transavia PL-12 Airtruk	6 May 74	1	S	Ashley-Clinton, New Zealand. Incompletely-modified nosewheel pivot leg assembly failed. Ref: NZ report 74-055.
G377	Piper PA-25 Pawnee	10 May 74	0	S	Loxahatchee, Fla. USA. Right main gear shock strut. NTSB file 3-2187.
G378	Cessna 411	1 Jun 74	0	S	Reno, Nev. USA. Bolt in right main gear retraction assembly. Ref: NTSB file 3-1488.
G379	Hawker Siddley Argosy 650	8 Jul 74	0	S	Point Hope, Alaska, USA. Port landing gear (stress corrosion cracking and fatigue). Ref: ICAO ADREP 1394/74.
G380	Cessna 172E	25 Jul 74	0	S	Fremont, Neb. USA. Nose gear scissors assembly. NTSB file 3-2016.
G381	Schweizer TSC-1A	9 Aug 74	0	S	Kissimmee, Fla. USA. Landing gear strut. Ref: NTSB file 3-3383.
G382	Cessna 320B	17 Aug 74	0	S	Sacramento, Cal. USA. Left uplock torque tube assembly support stud. Ref: NTSB file 3-2715.
G383	Grumman G-164 AgCat	21 Aug 74	0	S	Davis, Cal. USA. Right gear leg. Ref: NTSB file 3-2735.

G384	Piper PA-22	14 Sep 74	0	S	West Hickory, Pa. USA. Nosewheel assembly. Ref: NTSB file 3-3737.
G385	MBB BO 209 Monsun	5 Oct 74	0	S	Koenigsdorf, W. Germany. Nose gear strut attachment. Ref: W. German file 3X0457.
G386	Cessna 172	2 Nov 74	0	S	Richland, Wash. USA. Left gear (14" above axle at spot weld). Ref: NTSB file 3-4077
G387	Canadair CL-44 (Tradewinds)	22 Dec 74	0	S	Lusaka, Zambia. Nose gear radius rod. Ref: WAAS p 26/74.
G388	Cessna 182E	1975	0	S	Timboon, Vict., Australia. Fork of nose gear. Ref: Australia DoT.
G389	Cessna 180H	1975	0	S	Jindabyne, NSW, Australia. Right gear leg. Ref: Australia DoT.
G390	Piper PA 32-260 Cherokee SIX	1975	0	S	Iffley Stn. Qld, Australia. Left gear torque link bolt. Ref: Australia DoT.
G391	Auster 3F	1975	0	S	Warkworth NSW, Australia. Port gear gussett plate (poor weld). Ref: Australia DoT.
G392	Boeing 727-227	1975	0	S	Sydney NSW, Australia. Port main gear (trunnion). Groove machined in during manufacture. Ref: Australia DoT.
G393	Beech 58 Baron	1975	0	S	Townsville Qld. Australia. Retract rod ball end. Ref: Australia DoT.
G394	Boeing 707 (American)	18 Feb 75	0	S	Longview, Tex. USA. Nosewheel outer cylinder improperly machined. Ref: NTSB file 1-0003.
G395	Cessna 180	1 Mar 75	0	S	Lake Elmo, Mn. USA. Fatigue fracture. Rust corrosion break in right main gear leg. Ref: NTSB file 3-0717.
G396	Beech D18	6 Mar 75	0	S	St. Thomas, Virgin Islands. Tail wheel truss. Ref: NTSB file 3-0611.
G397	Cessna 421	16 May 75	0	S	Kuusamo Airfield, Finland. Bellcrank in nose gear retraction linkage. Ref: Finland BoA.
G398	Aeronca 7GCBC Citabria	14 Jun 75	0	S	Frechen, W. Germany. Left main gear leg strut attachment below cowling. W. German file 3X0202.
G399	Cessna 170	14 Jun 75	0	S	Calgary, Alta. Canada. Left wheel axle. Ref: MoT Canada file W50044.

G400	Socata 892A Rallye Commodore	17 Jun 75	0	S	Huensborn, W. Germany. Nosewheel axle spindle bolts. Ref: W. German file 3X0209.
G401	Beech 60A Duke	23 Jul 75	0	S	Duesseldorf, W. Germany. Wheel rim of left main landing gear. Ref: W. German file 3X0313.
G402	Cessna 185A	3 Aug 75	0	S	Casper, Wy. USA. Left main wheel outer half. NTSB file 3-2183.
G403	Cessna 180	6 Aug 75	0	S	Wheatland, Wy. USA. Spring landing gear (outside retainer wedge). Ref: NTSB file 3-2184.
G404	Boeing 727 (American)	23 Aug 75	0	S	Buffalo, N.Y. USA. Link assembly trunnion of left main gear. Ref: NTSB file 1-0027.
G405	Handley Page Herald (Arkia)	28 Aug 75	0	S	Tel Aviv, Israel. Right main gear actuating hydraulic cylinder. Ref: WAAS p. 18/75.
G406	Vickers Viscount (Alidair)	14 Sep 75	0	S	Guernsey, Channel Is., UK. Nosewheel rear drag members. Ref: WAAS p 20/75
G407	Douglas DC-6B (Zantop)	24 Sep 75	0	S	Cleveland, Oh. USA. Corner radius of reworked nose gear assembly. Ref: WAAS p. 21/75.
G408	Piper PA-25-260	4 Oct 75	0	S	Varkaus, Finland. Landing gear fastening bracket. Finland BoA.
G409	Socata 885 Super Rallye	12 Oct 75	0	S	Noerdlingen, W. Germany. Main landing gear strut attachment. Ref: W. German file 3X0472.
G410	Cessna 402A	13 Oct 75	0	D	Miyako Airport, Japan. Side link support rib, left landing gear. Ref: Japan MoT.
G411	Luscombe 8A	18 Oct 75	0	S	Willow, Ark. USA. Right float attach fitting. NTSB file 3-2438.
G412	Cessna 195	4 Nov 75	0	S	Elko, Nev. USA. Left spring steel gear leg. NTSB file 3-3679.
G413	Boeing 747 (BAOD)	8 Nov 75	0	S	Bombay, India. Inner hub, no. 8 main wheel. Ref: WAAS p 24/75
G414	Grumman G-164A AgCat	23 Dec 75	0	S	Zellwood, Fla. USA. Main landing gear. Ref: NTSB file 3-4049.
G415	Cessna 210B	1976	0	S	Alice Springs, NT, Australia. Hyd. actuator cracked. Ref: Australia DoT.

G416	Cessna 185A	1976	0	S	Wilton, NSW, Australia. Right outboard landing gear support bracket. Ref: Australia DoT.
G417	Cessna 210G	1976	0	S	Moorabin, Vict., Australia. Port main gear saddle assembly. Ref: Australia.
G418	Piper PA 31-310 Navajo	1976	0	S	Moorabbin Vic., Australia. Hinge on right gear door. Ref: Australia.
G419	Piper PA 22-160	1976	0	S	Chilchil Stn., Australia. Right gear leg (weld). Ref: Australia DoT.
G420	Piper PA 23-250 Aztec	1976	0	S	Prosperine Qld., Australia. Right main gear drag link centre bolt (excessive wear). Ref: Australia DoT.
G421	Fletcher FU-24	21 Jan 76	0	S	Palmerston North, New Zealand. Brackets which attach to piston & scissors link. (weld). Ref: NZ brief 76-014.
G422	Cessna 172	7 Feb 76	0	S	Gananoque, Ont. Canada. Left main gear leg. MoT Canada file 060013.
G423	Cessna 140	10 Feb 76	0	S	Vankleek Hill, Ont. Canada. Left ski axle. Ref: MoT Canada file 060016.
G424	Interstate S1B1	26 Feb 76	0	S	Wasilla, Alas. USA. Landing gear failed. Rust found along break. Ref: NTSB file 3-0130.
G425	Cessna 210H	16 Mar 76	0	S	Dothan, Ala. USA. Saddle fitting clamp of main gear. Ref: NTSB file 3-0099.
G426	Piper PA-12 Super Cruiser	18 Mar 76	0	S	Elliot Lake, Ont. Canada. Shock cord attachment bolt (left ski). Ref: MoT Canada file 060019.
G427	Grumman G-164A AgCat	19 Apr 76	0	S	Kaplan, La. USA. Right gear leg. Ref: NTSB file 3-0928.
G428	Cessna 180 Skywagon	17 May 76	0	S	Red Lake, Ont. Canada. Main gear leg. Ref: MoT Canada file C60041.
G429	Cessna 172	31 May 76	0	S	Deerfield Beach, Fla. USA. Main landing gear. Ref: NTSB file 3-2120.
G430	Piper PA-12 Super Cruiser	5 Jun 76	0	S	Arthur, Ont. Canada. Left undercarriage (fatigue and corrosion). Ref: MoT Canada file 060050.
G431	Beech 95 Baron	13 Jun 76	0	S	Wallkill, N.Y. USA. Nose gear aft drag brace. Ref: NTSB file 3-1396.

G432	Cessna 180	20 Jun 76	0	S	Gelnhausen, W. Germany. Main landing gear strut attachment. Ref: W. German file 3X0251.
G433	Piper PA-28 Cherokee	9 Jul 76	0	S	Big Bear City, Cal. USA. Main gear, upper scissors gear strut lugs. Ref: NTSB file 3-1701.
G434	Beech 95-C55 Baron	24 Aug 76	0	S	Perth WA, Australia. Nose gear actuator arm. Ref: Australia DoT.
G435	Cessna 305	25 Aug 76	0	S	Manhattan, Kans. USA. Main gear (broken bolt). Ref: NTSB file 3-2355.
G436	Champion 7ECA	4 Sep 76	0	S	Charleston, S.C. USA. Right main gear attach bolts. NTSB file 3-2804
G437	Champion 7GCBC Citabria	18 Sep 76	0	S	Winzeln, W. Germany. Shock strut of left main gear. Ref: W. German file 3X0481.
G438	Cessna 402B	7 Oct 76	0	S	Hachinoe, Japan. Torque arm support bracket, nose gear. Ref: Japan MoT.
G439	Auster J1B-L	1977	0	S	Murray Bridge, SA, Australia. Landing gear radius rod. Ref: Australia DoT.
G440	Piper PA-28-140 Cherokee	1977	0	S	Bankstown, NSW, Australia. Left main gear torque link (lower shackle bolt). Ref: Australia.
G441	Cessna 180G	1977	0	S	Boorowa, NSW, Australia. Left main gear spring leg. Ref: Australia DoT.
G442	Piper PA-28-140 Cherokee	1977	0	S	Murray Bridge, S.A. Australia. Torque link bolt in main undercarriage. Ref: Australia DoT.
G443	Luscombe 8C	27 Mar 77	0	S	Pittsfield, Ma. USA. Landing gear struts. Ref: NTSB file 3-2130.
G444	Stinson SR-8C	10 Apr 77	0	S	Eveleth, Minn. USA. Landing gear. Ref: NTSB file 3-0974.
G445	de Havilland DHC-3 Otter	14 Apr 77	0	S	GB-1, Que. Canada. Bolt holding right gear strut to the fuselage (lubrication hole). Ref: MoT Canada file Q70030.
G446	Aeronca 7GCBC Citabria	16 Jul 77	0	S	Albstadt-Degerf., W. Germany. Right main gear leg strut attachment below cowling. Ref: W. German file 3X0349.
G447	Beech D18S	22 Jul 77	0	S	Bemidji, Minn. USA. Gear collapsed, bolt. NTSB file 3-2471.

G448	Grumman S2E Tracker (RAN)	29 Aug 77	0	S	At sea, HMAS Melbourne. Nose wheel trunnion. Ref: Royal Australian Navy
G449	Luscombe 8E	3 Sep 77	0	S	Mormon Lake, Ariz. USA. Main landing gear. Ref: NTSB file 3-1947.
G450	Douglas DC-8-61	2 Oct 77	0	S	Shannon Airport, Limerick, Ireland. Inboard half of #3 wheel rim. Ref: Ireland
G451	Cessna 170A	30 Oct 77	0	S	Bielefeld-Wdbl., W. Germany. Axle of left main landing gear wheel. Ref: W. German file 3X0551.
G452	Cessna 185 Skywagon	6 Nov 77	0	S	Winnipeg Beach, Man. Canada. Left landing gear leg at wheel axle mount (axle bolt mounting holes). MoT Canada file C70148
G453	Beech 58 Baron	15 Nov 77	0	S	Archerfield Qld., Australia. Nose gear retract rod. Ref: Australia DoT.
G454	Cessna 182E	1978	0	S	Beverley, WA, Australia. Right strut, corrosion fatigue. Ref: Australia.
G455	Cessna 210B	1978	0	S	Moorabbin, Vict., Australia. Right actuator spindle. Ref: Australia DoT.
G456	Cessna 210A	1978	0	S	Rockhampton, Qld. Australia. Hydraulic line between nose gear door actuator & up-lock actuator. Australia DoT.
G457	Cessna 210H	1978	0	S	Toowomba, Qld., Australia. Left main gear saddle fractured (misrigging). Ref: Australia DoT.
G458	Cessna 210L	21 Jan 78	0	S	Flagstaff, Ariz. USA. Left main gear downlock hook assembly. Ref: NTSB file 3-0655.
G459	Grumman G-44 Widgeon	14 Feb 78	0	S	Pilot Point, Ak. USA. Right main gear retract strut. NTSB file 3-1661
G460	Cessna 177	12 Apr 78	0	S	Hartford, Conn. USA. Left main gear bolt. Ref: NTSB file 3-2327.
G461	Cessna 188	15 May 78	0	S	Cochran, Ga. USA. Main landing gear. Ref: NTSB file 3-2048.
G462	Cessna 180 Skywagon	10 Jun 78	0	S	Grand Centre, Alta. Canada. Right undercarriage leg near attachment holes. Ref: MoT Canada file W80049.
G463	SIAI-Marchetti 205-20/R	11 Jun 78	0	S	Straubing, W. Germany. Left main gear actuator rod (thread). Ref: W. German file 3X0186.
G464	Grumman G-164A AgCat	13 Jun 78	0	S	Pine Prairie, La. USA. Landing gear bolts. Ref: NTSB file 3-1167.

G465	Cessna 180 Skywagon	23 Jun 78	0	S	Manning, Alta. Canada. Left gear at upper forward axle attaching bolt hole. Ref: MoT Canada file W80064.
G466	Dyke Delta JD-2	6 Aug 78	0	S	Little Rock, Ark. USA. Gear locking mechanism: forward bottom portion of landing gear handle. Ref: NTSB file 3-1782.
G467	Piper PA-22	12 Aug 78	0	S	Datil, N.M. USA. Left tube of nose gear mount. NTSB file 3-2266
G468	Bellanca 7ECA Citabria	20 Aug 78	0	S	Rockton, Ont. Canada. Left undercarriage leg. MoT Canada file 080072.
G469	Bellanca 7GCBC Citabria	15 Sep 78	0	S	Thorton, Co. USA. Left main wheel axle. Ref: NTSB file 3-2752.
G470	Ted Smith Aerostar 601P	20 Sep 78	0	S	Stansted, UK. Torque links on both main gear legs. Ref: ICAO ADREP 439/78.
G471	Cessna 402	27 Sep 78	0	S	Indianapolis, Ind. USA. Landing gear cylinder and trunnion. Ref: NTSB file 3-3777.
G472	Beech D55 Baron	16 Dec 78	0	S	Parafield SA. Australia. Right gear, main retract braze rod end (threaded shank). Ref: Australia DoT
G473	Transavia PL-12 Airtruk	1979	0	S	Mudgee, NSW, Australia. Right main gear, attach lugs. Ref: Australia.
G474	Beech 95 Travel Air	1979	0	S	Alice Springs, NT, Australia. Worm shaft retaining collets. Ref: Australia.
G475	Aero Commander 690	1979	0	S	Perth WA, Australia. Torque link shaft, right gear. Ref: Australia.
G476	Cessna U206	4 Jan 79	0	S	Atmautluak, Ak. USA. Main landing gear. Ref: NTSB file 3-0392.
G477	Convair 580 (Frontier)	19 Jan 79	0	S	St. Louis, Mo. USA. Nose gear drag strut. NTSB file 1-0018.
G478	Cessna 185 Skywagon	6 Feb 79	0	S	Granville Lake, Man. Canada. Left gear attachment casting. Ref: MOT Canada file C90012.
G479	Fokker F-27 (NLM)	10 Mar 79	0	S	Birmingham Airport, UK. Nose gear attachment lugs (corrosion pit). Ref: WAAS p. 7/79.
G480	Cessna 180J (skis)	11 Mar 79	0	S	Charlottetown, Lab., Canada. 2 bolts attaching right ski axle. Other 2 bolts had been missing. MoT Canada file A90007

G481	Cessna A188B	5 May 79	0	S	Newman, Cal. USA. Right main strut. NTSB file 3-0835.
G482	Vickers Viscount VC-2 (British Airways)	25 May 79	0	S	Cardiff Airport, Wales, UK. Bolt in uplock mechanism of left gear. Ref: WAAS p. 13/79.
G483	Cessna 402B	9 Jun 79	0	S	Kikaiga Island, Japan. Welding fitting part, left main gear torque tube. Ref: Japan MoT.
G484	Cessna 180 Skywagon	9 Jun 79	0	S	Arthur North, Ont. Canada. Right main gear leg at fuselage. 15,000 landings. Ref: MOT Canada file 090057.
G485	Douglas DC-3C	22 Jul 79	0	S	Tampa, Fla. USA. Both arms of right gear, rear strut. Ref: NTSB file 3-3158.
G486	Boeing 727 (Continental)	7 Aug 79	0	S	El Paso, Tex. USA. Down-lock rod. Ref: NTSB file 1-0021.
G487	Boeing 737-100 (Wein Air Alaska)	18 Aug 79	0	S	Dillingham, Ak. USA. Port lower drag strut bolt. Intergranular corrosion from worn chrome plating. Corrosion & fatigue fracture. Ref: ICAO ADREP 230/79.
G488	Cessna 402	8 Sep 79	0	S	Adelaide, SA, Australia Starboard gear torque tube bellcrank (misrigging). Ref: Australia DoT.
G489	Boeing PT-17	13 Sep 79	0	S	Shreveport, La. USA. Left main gear. Ref: NTSB file 3-2193.
G490	de Havilland DH-82A Tiger Moth	14 Oct 79	0	S	Cypress, Tex. USA. Eye on right axle assembly. NTSB file 3-2522.
G491	Cessna 310	5 Dec 79	0	S	Mackay, Qld. Australia. Right gear uplock actuating rod. Ref: Australia
G492	Cessna A188	1980	0	S	Dorrigo, NSW, Australia. Tailwheel assembly. Ref: Australia DoT.
G493	Rockwell OV-10A Bronco (USAF)	1980	?	?	USA? Nose gear fork at fillet radius just aft of jack point. Matl: 7075-T73 forging. Ref: Burns & Haines, USAF SA-ALC/MM-7588, p. 2.
G494	Britten-Norman BN-2A Islander	6 Feb 80	0	S	Mont Joli, Que. Canada. Left oleo scissor link pin bolt. Exceeded 50-hour inspection. Ref: MOT Canada file Q00009.
G495	de Havilland DHC-6 Twin Otter	7 Feb 80	0	S	College Station, Tx. USA. Right lower landing gear leg separated at Y-joint. Ref: NTSB file 3-3085.

G496	Cessna 185 Skywagon (skis)	29 Feb 80	0	S	Poplar Point, Sask. Canada. Left outboard landing gear support bracket. Ref: MOT Canada file C00012.
G497	Cessna 180 Skywagon (skis)	4 Mar 80	0	S	Cawdron Lake, Ont. Canada. Left main gear spring leg close to fuselage (fretting & galling). MOT Canada file 000018.
G498	Cessna 310I	7 Mar 80	0	S	Mammoth Lakes, Ca. USA. Right main landing gear support forging. Ref: NTSB file 3-0469.
G499	Cessna 185 Skywagon	14 Mar 80	0	S	Baie Johan Beetz, Que. Canada. Right ski support bracket. Ref: MOT Canada file Q00022.
G500	Cessna 185 Skywagon	15 Mar 80	0	S	Pikangikum, Ont. Canada. Right main gear support bracket Ref: MoT Canada file C00017.
G501	Stolp Starduster Too	5 Apr 80	0	S	Ashland, Oh. USA. Main gear, tubular structure at fuselage attachment point. Ref: NTSB file 3-0335.
G502	Champion 7ECA Citabria	6 Apr 80	0	S	Joliette Airport, Que. Canada. Main gear leg through-bolt (bolt undertorqued). Ref: MOT Canada file Q00028.
G503	Piper PA 31-310 Navajo	30 Apr 80	0	S	St. Hubert, Que. Canada. Front hinge of right inboard gear door. Origin: coarse grinding. Ref: MoT Canada file Q00035.
G504	Cessna 140A	30 Apr 80	0	S	Atlanta, Ga. USA. Right landing gear spring. NTSB file 3-0945.
G505	Douglas DC-6 (Zantop)	10 Jun 80	0	S	Indianapolis, In. USA. Nosewheel steering, upper torque link. Ref: NTSB file 1-0006.
G506	Piper J-3 Cub	13 Jun 80	0	S	Celt Lake, Ont. Canada. Left float attachment. Ref: MoT Canada file C00072.
G507	Swearingen SA-226A	16 Jun 80	0	S	Birmingham, Al. USA. Right main gear door uplock roller. Ref: NTSB file 3-2914.
G508	Cessna 402B	3 Jul 80	0	S	Van Nuys, Ca. USA. Right main landing gear side brace lock link. Ref: NTSB file 3-3580.
G509	Cessna U206	28 Jul 80	0	S	Kenai, Ak. USA. Nosewheel upper torque link assembly. Ref: NTSB file 3-3719.

G510	Helio H-250 Courier II	8 Aug 80	0	S	Keith Bay, NWT. Canada. Wheel axle. Ref: MOT Canada file C00101.
G511	Aero Commander 690A	23 Sep 80	0	S	Toledo, Oh. USA. Torque link shaft. Ref: NTSB file 3-2924.
G512	Aero Commander 600S-2R	1 Oct 80	0	S	Kettleman City, Ca. USA. Tail wheel trunnion. Fatigue due to corrosion. NTSB file 3-3096.
G513	Cessna 170	4 Oct 80	0	S	Wright, Wy. USA. Right landing gear axle. Ref: NTSB file 3-3354.
G514	Wittman Tailwind	4 Nov 80	0	S	Payson, Az. USA. Modified fork shaft housing on tail wheel assembly at weld bead. NTSB file 3-3198.
G515	Cessna 150	27 Nov 80	0	S	Alma, Que. Canada. Nosewheel fork collar (bolt holes). 5000 hours since new. Ref: MOT Canada fle Q00122.
G516	Lockheed L1011 TriStar (Saudi Arabian)	23 Dec 80	2	S	Near Qatar. Main landing gear, inboard wheel flange. Ref: Ref: ICAO ADREP 371/80.
G517	Douglas DC-8 (United)	29 Dec 80	0	S	Phoenix, Az. USA. Stress corrosion fatigue failure of right main gear bogie beam. Ref: NTSB file 1-0014.
G518	Piper PA-23 Aztec	1981	0	S	Wangi Stn, NT, Australia. Main gear drag link bolt. Ref: Australia DoT.
G519	Jodel D11	1981	0	S	Camden NSW, Australia. Upper section of strut, left gear (weld). Ref: Australia DoT.
G520	Boeing 727	31 Jan 81	0	S	Flushing, N.Y. USA. Fatigue fracture of reworked trunnion link at stress corrosion area. Ref: NTSB file 1-0011.
G521	Piper PA-22	28 Feb 81	0	S	Knik Glacier, Ak. USA. Nosewheel assembly. Ref: NTSB file 3-0522.
G522	Bellanca 7ECA Citabria	4 Mar 81	0	S	Snow Lake, Man. Canada. Ski axle (weld). Ref: MOT Canada file C10019.
G523	Piper PA-36-375 Pawnee Brave	14 Mar 81	0	S	Geraldine, New Zealand. Left gear leg. Ref: NZ brief 81-033.
G524	Cessna 195	22 Mar 81	0	S	Redwood Falls, Mn. USA. Right gear spring. Ref: NTSB file 3-0752.
G525	Cessna 185 Skywagon (skis)	28 Mar 81	0	S	Lac Pletipi, Que. Canada. Right main gear support bracket (fatigue corrosion). Ref: MoT Canada file Q10023.

G526	Piper PA-18 Super Cub	22 Apr 81	0	S	Fresno, Ca. USA. Main gear strut assembly rod. NTSB file 3-0626.
G527	Piper PA-28 Cherokee Cruiser	28 Apr 81	0	S	Sept Iles, Que. Canada. Right main gear torque links, AD not complied with. Ref: MOT Canada file Q10031.
G528	Mooney M-20F Executive 21	2 May 81	0	S	Hamilton, Ont. Canada. Nose gear steering shaft. Ref: MOT Canada file 010026.
G529	Boeing 707	11 May 81	0	S	Kilgali/Kanombe Airport, Rwanda. Nose gear shaft. Stress-corrosion & fatigue crack. Origin: corrosion pit. Ref: Rwanda.
G530	Bellanca 8GCBC Scout	31 May 81	0	S	St Andre Avellin, Que. Canada. "U" bolt, left main gear. Ref: MoT Canada file 81-Q10046.
G531	Piper PA 36-375 Pawnee Brave	29 Jun 81	0	S	Whana Whana, New Zealand. Left gear leg. Ref: NZ brief 81-061.
G532	Cessna 172N	30 Jul 81	0	S	Glenville, W.V. USA. Main gear attachment bolt. NTSB file 3-1642.
G533	Cessna 170	3 Aug 81	0	S	Middle Lake, Sask. Canada. Left axle. Ref: MOT Canada file C10091.
G534	Piper PA-34 Seneca	10 Aug 81	0	S	Wenatchee, Wa. USA. Main landing gear. Ref: NTSB file 3-2726.
G535	Piper PA-18-125 Super Cub	18 Aug 81	0	S	Burg Feuerstein, W. Germany. Main landing gear leg. Ref: W. German file 3X0442.
G536	Piper PA-38-112 Tomahawk	17 Sep 81	0	S	Ardmore, New Zealand. Front clamping bolt, left gear leg. Ref: New Zealand brief 81-076.
G537	Cessna 180	27 Sep 81	0	S	Corcoran, Mn. USA. Spring arm at upper 2 axle attach bolt holes. Ref: NTSB file 3-2792.
G538	Howard DGA-15 Nightingale	26 Oct 81	0	S	Dryden, Ont. Canada. Left main gear upper strut. Ref: MOT Canada file C10136.
G539	Cessna 140	19 Nov 81	0	S	Barrett Lake, Ca. USA. Right main gear strut at step attach bolt hole. Ref: NTSB file 3-3151.
G540	Champion 7ECA Citabria	20 Jan 82	0	S	St. Jean, Que. Canada. Ski right gear leg at fuselage attachment (corrosion pits). Ref: MOT Canada file Q20008.

G541	Cessna 140 (on skis)	22 Jan 82	0	S	Kajaani, Finland. Left landing gear. Ref: Finland BoA.
G542	Britten-Norman BN-2A Islander	20 Sep 82	0	S	Sable Island, N.S. Canada. Bulkhead to which nosegear was attached. Ref: MoT Canada file A20022.

Total Fatalities: 21

APPENDIX H

FIXED-WING AIRCRAFT - MISCELLANEOUS

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
H1	N. American P-51 Mustang (USAF)	Mar 44	1	D	Boxted, Essex. UK. Engine mounting bolts. Engine separated. (Faulty heat treatment). Ref: Ethell, "Mustang - A Documentary History of the P-51", p. 63.
H2	Douglas DC-3 Dakota (Canadian Forces)	14 May 51	4	D	Lac Boltier, Que. Canada. Engine bearers & reduction gear housing cracked (origin: engine-mount welds). Ref: CF ACAIRS
H3	Zlin 326	1 May 63	1	D	Oulu Airport, Finland. During towing, sailplane's cylinder cap broke and pilot interrupted towing. While turning back to airport, aircraft crashed. Finland BoA
H4	Grumman G-73 Mallard	20 Mar 64	0	S	Key West Airport, Fla. USA. Main hydraulic pressure line tee fitting. Ref: NTSB file 2-0168.
H5	Grumman G-73 Mallard	20 Mar 64	0	S	West Palm Beach Airport, Fla. USA. Hydraulic line (tool damage). NTSB file 3-0817.
H6	Meyers MAC 145	2 May 64	0	S	Chicago, Ill. USA. Right brake master cylinder actuating rod. Ref: NTSB file 3-1127.
H7	Piper J-3C	4 Jul 64	0	D	Houston, Texas USA. Right brake pedal attaching lugs. Ref: NTSB file 3-1919.
H8	Boeing E-75 Stearman	12 Jul 64	0	S	Sherbrooke, Que. Canada. Engine attachment bolts. Ref: MoT Canada file F-341.
H9	Boeing E75N1 Stearman	13 Jul 64	0	S	Mercedes, Tex. USA. Engine tearaway. Engine structure: mount and vibration isolators. Ref: NTSB file 3-2055.
H10	Fairey Gannet (RAN)	23 Mar 65	1	D	At sea, HMAS Melbourne. Bill of arrestor hook broke during arrested landing. Ref: Royal Australian Navy.
H11	Piper PA-22	5 Jul 65	0	S	Underwood, Wash. USA. Master brake cylinder diaphragm. NTSB file 3-2517

MISCELLANEOUS (FIXED-WING)

H12	Cessna 180	3 Sep 65	0	S	Tarentum, Pa. USA. Left brake. Ref: NTSB file 3-2487.
H13	Lake LA-4	16 Sep 67	0	S	Flesherton, Ont. Canada. Propeller governor oil line tube (fretting) caused engine oil starvation. Ref: MoT Canada file 3612.
H14	Beech A23 Musketeer	5 Dec 67	0	S	Chamblee, Ga. USA. Both brake castings. Ref: NTSB file 3-4376
H15	N. American F-86 Sabre (Royal Australian AF)	3 Jan 68	1	?	Ubon, Thailand. Bolt in engine intake. Bolt head ingested by engine. Ref: Australia Dept. of Defence.
H16	Cessna 195A	5 Dec 68	0	S	Paso Robles, Cal. USA. Left brake actuating rod. Ref: NTSB file 3-4213
H17	Cessna 210	1970	0	S	Archerfield, Qld. Australia. Hydraulic line. No fluid to lower gear. Ref: Australia DoT.
H18	Cessna 182	30 Aug 70	0	S	Carey, Id. USA. Right brake line broken adjacent to step. Ref: NTSB file 3-3454.
H19	Lockheed C-5A Galaxy (USAF)	29 Sep 71	0	S	Altus AFB, Okla., USA. Engine pylon fatigue failure during ground runup. Outboard truss member in aft pylon mount. Ref: Ref: AWST 8 Nov 71, p. 19
H20	C.A.C. Austrl. CA-28C Ceres	1973	0	S	Leeton NSW, Australia. Port brake line at work hardened area. Ref: Australia DoT.
H21	Aero Commander 685	18 Apr 76	0	S	Chicago, Ill. USA. Hydraulic system. Origin: points of increased diameter and interior disturbances in tubing. Loss of brakes and flaps. NTSB file 3-2685.
H22	Saab-Scania SK37 Viggen (Swedish Air Force)	15 Nov 76	0	D	Edsbyn, Sweden. Attachment of engine front cowl. Ref: Swedish AF.
H23	Cessna A188B	1977	0	S	Quairading, WA, Australia. Crack in port brake line. Ref: Australia DoT.
H24	Grumman G-164 AgCat	1977	0	S	Wee Waa NSW, Australia. Aircraft ground looped. Left leg detached. Flexible hose from brake master cylinder in perished condition. Ref: Australia DoT.
H25	Saab-Scania SH37 Viggen (Swedish Air Force)	10 Mar 77	0	D	Vastervik, Sweden. Heat shield in engine. Ref: Swedish AF.

H26	Boeing 707-100 (American)	5 Apr 77	0	S	St. Louis, Mo. USA. No. 3 pylon mid-spar attachment fitting. Pylon & engine separated. Ref: ICAO ADREP 1311/77; WAAS p. 11/77.
H27	Saab-Scania S35E Draken (Swedish Air Force)	6 Apr 77	0	D	Nykoping, Sweden. Support profile in engine exhaust. Ref: Swedish AF.
H28	Cessna 320 Skynight	8 Aug 77	0	S	Tsuniah Lake, B.C. Canada. Fuel vent line nipple. Ref: MoT Canada file P70907.
H29	Scheibe Bergfalke-III	9 Aug 77	0	S	Unterwoessen, W. Germany. Clutch support structure strut assembly. Ref: W. German file 3X0424.
H30	AESL 115/A2 Airtourer	1978	0	S	Bamawn Vic., Australia. Brake line. Ref: Australia DoT.
H31	Cessna 182M	1978	0	S	Bunbury WA, Australia. Broken brake cable. Ref: Australia DoT.
H32	Piper PA-23 Aztec	18 Jan 79	3	D	Scottown, Ohio USA. Left engine propeller governor oil line failed. Wrong part. Aluminum tube used, and manufacturer specified steel. Ref: NTSB file 3-2488.
H33	McDonnell Douglas DC-10 (American Airlines)	25 May 79	273	D	Chicago, Ill. USA Pylon failed & engine separated. Crack caused by faulty maintenance & propagated by fatigue. Airframe hours: 19,871. Ref: AWST Feb. 11/80
H34	Boeing 747-121 (Pan American)	27 Dec 79	0	S	Heathrow Airport, London, England. Pylon forward bulkhead of #4 engine. Crack on Inconel horse collar chord. Initiation maybe from prior collision with baggage container. Ref: AWST 30 Nov 81 p 149-
H35	Piper PA-22-108	13 Jan 80	0	S	Groblersdal, Republic of South Africa. Brake pressure pipe at master cylinder. Origin: belling of pipe. Ref: South Africa DoT.
H36	Robin DR 400	28 Jun 81	0	S	Bad Neuenahr, W. Germany. Engine mount. Ref: W. German file 3X0284.
H37	R.F.C. Skyrider 20 (ultralight)	4 Jul 82	2	D	Clappisons Corners, Ont. Canada. Propeller driveshaft rear bearing lower housing. Ref: Canadian Ultralight News, Feb/83, p 2

Total Fatalities 284

PART II
LISTING BY AIRCRAFT TYPE

APPENDIX I

LIST OF FIXED-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
					AERO COMMANDER A-9 AG COMMANDER (See CallAir A-9)
					AERO COMMANDER 100 DARTER COMMANDER
	Propeller				
F123	Aero Commander 100	8 Jun 73	0	S	Albany, N.Y. USA. Propeller blade (7" from tip).
F146	Aero Commander 100	24 May 75	0	S	Stowe, Vt. USA. Part of prop blade shed.
					AERO COMMANDER 112
	Engine				
E269	Aero Commander 112A	21 Aug 76	0	D	Santa Ana, Calif. USA. Throttle-power lever assembly.
	Propeller				
F159	Aero Commander 112A	5 Nov 75	0	D	McFarland, Calif. USA. About 6 inches of propeller separated.
F178	N. American Rockwell 112	31 Dec 76	0	S	Wildorado, Tex. USA. Propeller blade. Hartzell prop HC-E2YR-1B, blade model F7666A.
					AERO COMMANDER 200 (MEYERS 200)
	Engine				
E32	Meyers 200B	17 Feb 64	0	S	Cleveland, Ohio. USA. No. 5 cylinder failed around the head.
E126	Aero Commander 200-D	30 Apr 70	0	S	Woodstock, Ga. USA. No. 2 conrod.
	Propeller				
F79	Meyers 200A	2 Aug 69	0	S	Vacaville, Cal. USA. Propeller came off, 4 prop hub bolts evidenced prior damage.
F129	Meyers 200B	14 Nov 73	0	S	Savannah, Ga. USA. Propeller (origin: root of top outboard thread)

Landing Gear

G54	Meyers 200A	22 Apr 64	0	S	Washington, D.C. USA. Nose wheel fork broken.
G135	Meyers 200A	23 Oct 65	0	S	Hawthorne, Cal. USA. Left gear lower torque link and down lock link.

AERO COMMANDER 500/520/560/680/681/685/690

Wing

A62	Aero Commander 680S	21 Nov 61	6	D	Mount Ruapehu, New Zealand. Separation of right wing. Lower spar cap, front spar at WS 24. Upper & lower rear spar caps had failed sometime previously from single load of unknown origin. Airframe hours: 5040
A73	Aero Commander 680E	1 Apr 64	4	D	Thompson, Man. Canada. Right wing separated. Front spar lower cap, WS 24. Airframe hrs: 5949. Role: low-level survey.
A81	Aero Commander 560E	27 Sep 67	7	D	Dallas, Texas USA. Left wing failure (spar). Two overlapping rivet holes found in aft leg of spar cap.

Window

C22	N. American Commander 681B	23 Feb 77	0	S	Ft. McMurray, Alta. Canada. Co-pilot's window shattered. Crazing on outer surface. Subsequent pressurization cycles caused fatigue rupture. 1769 airframe hours.

Engine

E54	Aero Commander 680	21 Jun 65	0	S	Cleveland, Ohio. USA. No. 4 cylinder.
E91	Aero Commander 560E	21 Feb 67	4	D	Tahoe Valley, Calif. USA. Impulse coupling cam assembly on magnetos.
E172	Aero Commander 680E	9 Aug 72	0	S	Cambridge, Ohio. USA. Crankshaft (3rd order counterweight ears).
E323	Aero Commander 680	28 Dec 78	1	D	Oklahoma City, Okla. USA. Conrod in left engine.

Propeller

F98	Aero Commander 500B	21 Jun 71	0	S	Crossett, Ark. USA. Right prop hub spider.
F102	Aero Commander 500B	18 Aug 71	0	S	Newport, R.I. USA. Left prop blade (hub clamp).
F122	Aero Commander 500B	1 Jun 73	0	S	Crownpoint, N. Mex. USA. Propeller: blade retention mechanism
F172	N. American Commander 500	12 Jul 76	0	S	Kamloops, B.C. Canada. Right propeller blade shed (corrosion pits).
F192	Aero Commander 500	4 Apr 78	0	S	Miami, Fla. USA. Left propeller blade separated.

Landing Gear

G56	Aero Commander 560	27 Apr 64	0	S	Paducah, Ky. USA. Nose gear extension bolt.
G60	Aero Commander 520	20 May 64	0	S	Indianapolis, Ind. USA. Nosewheel torque knee scissors.
G73	Aero Commander 520	30 Aug 64	0	S	Morristown, N.J. USA. Nose wheel fork.
G141	Aero Commander 520	8 Nov 65	0	S	Minneapolis, Minn. USA. Down lock and retract assembly. P/N 4730005.
G143	Aero Commander 520	17 Nov 65	0	S	Oklahoma City, Okla. USA. Right main wheel axle.
G163	Aero Commander 520	28 Mar 66	0	S	Muskogee, Okla. USA. Nose gear body assembly. P/N 4750022.
G194	Aero Commander 520	14 Oct 66	0	S	Houma, La. USA. Nose wheel fork (bolt holes).
G475	Aero Commander 690	1979	0	S	Perth WA, Australia. Torque link shaft, right gear.
G511	Aero Commander 690A	23 Sep 80	0	S	Toledo, Oh. USA. Torque link shaft, PN ED12406-1, failed on both ends.

Miscellaneous

H21	Aero Commander 685	18 Apr 76	0	S	Chicago, Ill. USA. Hydraulic system. Origin: points of increased diameter and interior disturbances in tubing. Loss of brakes and flaps.

AERO COMMANDER S-2 SNOW COMMANDER (See Snow S-2)

AERO COMMANDER 600 S-2R THRUSH COMMANDER

Engine

E133	Aero Commander S-2R	27 Jun 70	0	S	Eudora, Ark. USA. Main governor drive gear sheared.
E216	Aero Commander 600S-2R	17 Aug 74	0	S	Lake Providence, La. USA. Exhaust side of no. 4 cylinder head.
E217	Aero Commander S-2R	3 Sep 74	0	D	Kuopio, Finland. Connecting rod.
E261	Aero Commander 600S-2R	6 May 76	0	S	Hermiston, Ore. USA. Impeller shaft.
E393	N. American S-21 Thrush Commander	23 Jul 81	0	S	Fox Creek, Alta. Canada. No. 1 cylinder, fillets between cooling fins around exhaust valve ear. Pratt & Whitney R-1340 engine.

E396	Rockwell S-2R	5 Aug 81	0	D	Clarksburg, Ca. USA. Cylinder assembly.
E400	Aero Commander S-2R	4 Oct 81	0	S	Bakersfield, Ca. USA. No. 1 cylinder at end of threaded area, cylinder barrel top.
	Propeller				
F194	Aero Commander S-2R	28 Apr 78	0	S	Stringtown, Ms. USA. Propeller blade.
F211	Rockwell Thrush Commander	2 Jun 79	0	S	Lottery, Jamaica. Propeller blade.
	Landing Gear				
G512	Aero Commander 600S-2R	1 Oct 80	0	S	Kettleman City, Ca. USA. Tail wheel trunnion, P/N 5508-19. Fatigue due to corrosion.

AERONCA 7AC CHAMPION

	Engine				
E58	Aeronca 7AC Champion	10 Aug 65	0	S	Warrington, Pa. USA. No. 2 cylinder exhaust valve.
E97	Aeronca 7AC Champion	15 Aug 67	0	S	Commerce, Tex. USA. Loose prop retainer nut caused cracking of crankshaft.
	Landing Gear				
G127	Aeronca 7AC Champion	7 Sep 65	0	S	Ronan, Mont. USA. Landing gear stuffing box (improper weld).

AERONCA 7GCBC CITABRIA (See Champion Citabria)

AERONCA SUPER CHIEF

	Landing Gear				
G330	Aeronca 11AC Super Chief	18 Jul 72	0	S	Two Harbors, Minn. USA. Left front landing gear fitting lug (bolt holes).

AEROSPATIALE CARAVELLE

	Engine				
E272	Aerospatiale Caravelle	12 Oct 76	95	D	Bombay, India. Disintegration of 10th compressor stage of Rolls Royce Avon engine.
	Landing Gear				
G50	Sud Aviation Caravelle	17 Mar 64	0	S	Copenhagen, Denmark. Nose wheel axle (steel).
G185	Sud Aviation SE-210 Caravelle	22 Aug 66	0	S	Newark, N.J. USA. Nose wheel axle spindle (improperly shot-peened).
G370	Aerospatiale Caravelle 10B3	15 Mar 74	16	D	Tehran, Iran. Failure of attachment fitting of main undercarriage caused collapse of the gear, rupture of the main fuel tank, and a fire.

AESL AIRTOURER

Brake Line

H30	AESL 115/A2 Airtourer	1978	0	S	Bamawn Vic., Australia. Brake line.

AIRBUS INDUSTRIE A300

Engine

E404	Airbus Ind. A300	17 Mar 82	0	D	Sanaa Airport, North Yemen. H. p. turbine disk failed, fillet radius. GE CF6-50 engine.

AIRSPEED AMBASSADOR

Flaps

D19	Airspeed Ambassador AS.57 Series 2	3 Jul 68	6	D	Heathrow Airport, London England. Failure of port flap operating rod, permitting flap to retract.

Landing Gear

G23	Airspeed Ambassador	3 Mar 60	0	S	Woolsington Airport, UK. Port landing gear down-lock latch plate.

AIRTOURER (See AESL Airtourer)

AMERICAN AA-1 YANKEE (TRAINER, T-CAT, LYNX)

Flight Controls

D29	Grumman AA-1B	31 Jul 75	0	S	St. Andrews, Man., Canada. Left rudder centering spring.

Propeller

F95	American AA-1 Yankee	2 May 71	0	S	Fort Myers, Fla. USA. 5 1/8" prop blade missing.
F117	American AA1-A	30 Dec 72	0	S	Show Low, Ariz. USA. Propeller blade.
F147	Grumman American AA-1B	25 May 75	0	S	Tampa, Fla. USA. 4" blade tip shed (pits on leading edge).
F169	American AA-1B	27 Apr 76	0	S	Gorman, Cal. USA. Propeller (nick).

Landing Gear

G241	American AA-1 Yankee	21 Nov 68	0	S	Bayport, N.Y. USA. Nose gear strut above fork attach point.

AMERICAN AA-5

Engine

E211	American AA-5	16 Jun 74	0	S	Chula Vista, Cal. USA. Carb heat control cable.
E320	Grumman American AA-5	4 Oct 78	2	D	Littleton, Colo. USA. #3 cylinder at metal folds between barrel fins.

ARMSTRONG WHITWORTH ARGOSY

Landing Gear

G39	Armstrong Whitworth Argosy	2 Jul 62	0	S	Wilmington, Del. USA. Lower attach fitting of right gear drag strut. Origin: Upper rear corner radius.
G379	Hawker Siddley Argosy 650	8 Jul 74	0	S	Point Hope, Alaska, USA. Port landing gear (stress corrosion cracking and fatigue).

AUSTER J1B

Landing Gear

G439	Auster J1B-L	1977	0	S	Murray Bridge, SA, Australia. Landing gear radius rod.

AUSTER 3F

Landing Gear

G344	Auster 3F	1973	0	S	South Marulan NSW, Australia. Radius rod, right gear.
G345	Auster 3F	1973	0	S	Singleton NSW, Australia. Broken weld, stub axle fitting, right gear.
G391	Auster 3F	1975	0	S	Warkworth NSW, Australia. Port gear gussett plate (poor weld).

AUSTER 5D

Engine

E142	Auster 5D	1971	0	S	Camden NSW, Australia. Valve assembly.

AUSTER 5J1

Engine

E284	Auster 5J1	2 Jul 77	0	S	Dorsten-Wulfen, W. Germany. Crankshaft.

AVRO CF-100 CANUCK

Engine

E10	Avro CF-100 Canuck (Canadian Forces)	11 Aug 53	2	D	St-Hubert, Que. Canada. Failure of a Banjo bolt fitting in fuel system of starboard engine caused double flameout.

Flaps

D2	Avro CF-100 Canuck (Canadian Forces)	21 Apr 54	2	D	North Bay, Ont. Canada. Outboard hinge bracket of starboard flap.
D3	Avro CF-100 Canuck (Canadian Forces)	19 Jun 56	2	D	Bagotville, Que. Canada. Outboard hinge bracket of starboard flap. Flap separated.
D22	Avro CF-100 Canuck (Canadian Forces)	3 Mar 72	0	D	Mt. Tremblant Park, Que. Canada. Aileron trimmer tab fitting failed (fatigue and stress corrosion).

BARRETT CASSUT

Propeller

F84	Barrett Cassut	28 Aug 69	1	D	McCordsville, Indiana USA. Propeller.

BAYLES

Wing

A127	Bayles Special 1	13 Oct 79	2	D	Jackson, Tenn. USA.. Separation of wing. Bolt holding rear strut to fuselage failed.

BEECH 18/C-45

Wing

A27	Beech D18C	6 Dec 47	2	D	Wellsburg, W. Virginia, USA. Wing failure. Lower spar cap steel tube at toe of weld, right outboard wing panel.
A75	Beech G18S	16 Jul 64	4	D	Toadlena, New Mexico, USA. Wing failure, WS 81.
A78	Beech C-18S	15 Aug 66	4	D	Anchorage, Alaska USA. Right wing failed. Fracture adjacent to landing gear slide cluster.
A79	Beech C-45H	28 Feb 67	2	D	Middletown, Del. USA. Left wing failure. Lower cap of spar at weld approx 8 inches outboard of outer panel attach point.
A82	Beech E18S	28 Apr 67	1	D	Acworth, Georgia USA. Wing failure at WS 81, lower left spar (elliptical steel tube).
A102	Beech E18S	22 Jun 72	1	D	Cleveland, Ohio USA. Left wing separated. Lower spar cap, WS 81. Crack missed during prior inspection. Airframe hours: 8227
A107	Beech E18S	19 Apr 73	6	D	Davenport, Iowa USA. Separation of right wing. Lower spar cap, WS 81, at weld in spar. Crack missed in previous inspections.
A110	Beech D18S on floats	16 Oct 73	1	D	Thompson, Man. Canada. Separation of wing. Left wing lower spar cap. Crack undetected in prior x-ray.

Fuselage

C17	Beechcraft C-45H	12 Nov 65	0	S	San Juan, P.R. USA. Right and left flanges of bulkhead P/N 248 cracked, allowing nose gear drag leg to retract.

Flight Controls

D12	Beech C-45H	3 Mar 67	0	S	Janesville, Wis. USA. Fabric separation at elevator trim tab hinge and elevator-horizontal stabilizer hinge areas.

	Engine				
E63	Beechcraft C-45H	11 Oct 65	0	S	Kauai, Hawaii. USA. Fuel line to carburettor at fitting to carb.
E99	Beech E18S	8 Jan 68	3	D	San Diego, Calif. USA. Cracked shroud, 3rd stage stator assembly.
E237	Beech E18S	26 Jun 75	2	D	Toledo Ohio, USA. Fatigue - cylinder head. Unapproved mod. Standpipe cut off flush with bottom of oil tank
E290	Beech E18S	22 Aug 77	2	D	Catalina Island, Calif. USA. Cracks in combustion heater allowed fumes into cockpit.
E307	Beech 18	19 Jun 78	0	D	Windsor Locks, Ct. USA. No. 2 bearing of no. 1 engine failed. No. 2 power turbine blade failed.
	Propeller				
F20	Beechcraft E18S	16 Sep 64	0	S	Fort Lauderdale, Fla. USA. Propeller blade.
F23	Beech E18S	3 Jan 65	4	D	Henderson, Ky. USA. Engine tear-away after in-flight separation of no. 1 propeller blade.
F45	Beech D18S	10 Feb 67	3	D	Dallas, Texas USA. Propeller blade at shank radius.
F141	Beech E18S	7 Oct 74	0	S	Topeka, Kans. USA. Prop failure, right engine (wrong crankshaft counterweight combination installed).
F185	Volpar H18	20 Jul 77	0	S	Galena, Alas. USA. Propeller pitch changing mechanism.
F188	Beech E18S	1 Oct 77	0	D	Plymouth, In. USA. Propeller (nick)
	Landing Gear				
G132	Beechcraft C-45H	1 Oct 65	0	S	Killeen, Tex. USA. Landing-gear rocker arm switch.
G162	Beech C-45G	23 Mar 66	0	S	Kanapali, Hawaii. USA. Nose gear attach points.
G242	Beech E18S	20 Dec 68	0	S	Los Angeles, Cal. USA. Attach screw to push rod assembly.
G247	Beech E18S	5 Feb 69	0	S	La Crosse, Wis. USA. Landing gear slide tube. (Lubricant deteriorated in idler sprocket bearing).
G250	Beech C-45G	21 Mar 69	0	S	Fort Lauderdale, Fla. USA. Nose gear fork.

G253	Beech G18S	5 May 69	0	S	Tulsa, Okla. USA. Right main gear drag leg (weld). P/N 404-188405-6
G281	Beech E18S	3 Oct 70	0	S	Anniston, Ala. USA. Main landing gear support assembly.
G348	Beech D18S	14 Mar 73	0	S	Oakland, Cal. USA. Right hand drive shaft support bracket of nose gear.
G356	Beech C-45H	17 Aug 73	0	S	Los Angeles, Cal. USA. Right brake froze due to worn brake puck, overstressed weakened right drag link of main gear.
G396	Beech D18	6 Mar 75	0	S	St. Thomas, Virgin Islands. Tail wheel truss.
G447	Beech D18S	22 Jul 77	0	S	Bemidji, Minn. USA. Gear collapsed, bolt P/N 404-188466.

BEECH BARON (TRAVEL AIR, COCHISE)

	Engine				
E263	Beech 95-B55 Baron	29 May 76	4	D	Holly Springs, Miss. USA Camshaft gear teeth failed, crack in undersized radii at gear teeth roots.
E266	Beech 58 Baron	3 Aug 76	6	D	Chillicothe, Mo. USA. Crankshaft at crack in no. 7 crankcheek.
E326	Beech 58P Baron	29 Jan 79	0	S	Amarillo, Tex. USA. Crankshaft.
E327	Beech 58 Baron	5 Feb 79	0	S	Kalgoorlie WA, Australia. No. 3 cylinder inlet valve.
E373	Beech 55 Baron	10 Dec 80	0	S	Edmonton, Alta. Canada. No. 6 cylinder - piston con rod through I-beam section. Fatigue initiated as a result of rod having been bent by hydraulic lock.
	Propeller				
F14	Beech A55 Baron	30 Jan 64	0	S	Kansas City, Mo. USA. Propeller (threaded area of shank).
F30	Beech 95-B55 Baron	6 Jun 65	0	S	Schenectady, N.Y. USA. Right engine propeller mounting bolts.
F109	Beech 95 Travel Air	5 Apr 72	1	D	Miami, Fla. USA. Right prop blade failed 1 inch from base of shank.
F131	Beech 95-B55 Baron	29 Jan 74	0	S	Goodyear, Ariz. USA. Propeller hub.
F181	Beech 95-C55 Baron	25 Mar 77	0	S	Mackay Qld., Australia. Propeller hub. 100 hr check not done.

F182	Beech T-42A Cochise (US Army)	25 May 77	0	D	Al. USA. No. 1 propeller hub assembly. McCauley 2AF34C55 propeller.
F221	Beech 95-B55 Baron	17 Jul 80	0	S	Malden, Mo. USA. Hartzell prop hub clamp, Model PHC-A3VF-2B/V7636NB.
F232	Beech 58 Baron	27 Oct 81	0	S	Selma, Al. USA. McCauley prop hub, P/N D2AF34C30N.

Landing Gear

G301	Beech 95-C55 Baron	1971	0	S	Dampier WA, Australia. Nose gear, plunger rod assembly (fork end bolt holes).
G393	Beech 58 Baron	1975	0	S	Townsville Qld. Australia. Retract rod ball end.
G431	Beech 95 Baron	13 Jun 76	0	S	Wallkill, N.Y. USA. Nose gear aft drag brace.
G434	Beech 95-C55 Baron	24 Aug 76	0	S	Perth WA, Australia. Nose gear actuator arm P/N 35-825 172-2.
G453	Beech 58 Baron	15 Nov 77	0	S	Archerfield Qld., Australia. Nose gear retract rod at ball joint fitting.
G472	Beech D55 Baron	16 Dec 78	0	S	Parafield SA. Australia. Right gear, main retract braze rod end P/N AHM6 (threaded shank)
G474	Beech 95 Travel Air	1979	0	S	Alice Springs, NT, Australia. Worm shaft retaining collets.

BEECH BONANZA

Wing

A61	Beech 35 Bonanza	25 Mar 61	1?	D	Brookfield, Mass. USA. Wing failure. Centre-section steel truss.
A63	Beech 35 Bonanza	30 Sep 62	1?	D	Parsons, Kansas USA. Wing failure. Centre-section steel truss.
A68	Beech 35 Bonanza	13 May 63	1?	D	Perry, Oklahoma USA. Left wing failure. Forward centre-section steel truss at wing-fuselage attachment. Material: steel. Airframe hours: 4132.

Engine

E64	Beech 35 Bonanza	12 Oct 65	0	S	Carlsbad, Cal. USA. Magneto switch.
E79	Beech 35 Bonanza	10 Apr 66	0	S	Texico, N.Mex. USA. Carburetor alternate air door hinge.

E153	Beech A35 Bonanza	8 Oct 71	0	S	Campo, Cal. USA. # 2 cylinder hold-down studs. Under-torqued during overhaul.
E158	Beech M35 Bonanza	23 Nov 71	0	S	Owosso, Mich. USA. Crankshaft.
E171	Beech V35 Bonanza	19 Jul 72	0	S	Oneill, Neb. USA. Alum nipple P/N AN816-6D broke at turbocharger attaching point.
E183	Beech M35 Bonanza	1973	0	S	Morwell Vic. Australia. Crankshaft (by no. 2 connecting rod journal).
E184	Beech P35 Bonanza	1973	0	S	Mansfield Vic., Australia. Connecting rod bearing.
E212	Beech P35	30 Jun 74	0	D	Tutelake, Calif. USA. No. 1 conrod bolt.
E222	Beech H35 Bonanza	1 Dec 74	3	D	Hayward, Calif. USA. Crankshaft. Wrong propeller installed.
E224	Beech V35 Bonanza	20 Dec 74	0	S	St. Paul, Minn. USA. No. 5 connecting rod bolts.
E251	Beech 36 Bonanza	1976	1	D	Australia. Engine crankcase adjacent to cylinder attachment stud holes.
E256	Beech V35 Bonanza	31 Jan 76	0	S	Kings Park, N.Y. USA. Crankshaft NR639243.
E285	Beech 35 Bonanza	13 Jul 77	0	S	Clinton, Iowa. USA. Two supporting base studs of #2 cylinder.
E289	Beech P35 Bonanza	21 Aug 77	1	D	Pittsburgh, Penn. USA. Crankshaft (crack in area where bearing rotated)
E311	Beech M-35 Bonanza	2 Jul 78	0	S	Riveredge, Ohio. USA. Fuel injection system fracture. Flow divider diaphragm and shaft cup seal aged.
E321	Beech 36 Bonanza	10 Nov 78	0	S	Unalakleet, Alas. USA. Crankshaft.
E343	Beech A36 Bonanza	10 Sep 79	0	S	Cincinnati, Ohio. USA. Crankshaft.
E344	Beech N35 Bonanza	11 Sep 79	1	D	Olean, N.Y. USA. Crankshaft failed at crack 80% thru long crankcheek between no. 1 & no. 2 crank pins
E345	Beech 36 Bonanza	21 Sep 79	0	S	Bassett, Ne. USA. Crankshaft.

E376	Beech F33A Bonanza	3 Jan 81	0	S	St. Paul, Mn. USA. Poor quality control. No radius on fillet of camshaft where undercut for oil holes. Also undercut 0.005".
	Propeller				
F60	Beech S35 Bonanza	22 Oct 67	0	S	Baton Rouge, La. USA. Propeller (improper heat treated blade and hub workmanship at time of manufacture)
F64	Beech N35 Bonanza	13 Nov 67	1	D	Camden, Ark. USA. Both control bolts of propeller hub.
F66	Beech V35 Bonanza	17 Jan 68	0	S	Dell Rapids, S.Dak. USA. Propeller cylinder attach screws. Propeller in service approx. 170 hr.
F85	Beech K35 Bonanza	5 Sep 69	4	D	Provo, Utah USA. Propeller separation (prop pitch control bolts)
F110	Beech M35 Bonanza	12 May 72	1	D	Florissant, Mo. USA. Propeller pitch-change bolts.
F134	Beech 35 Bonanza	24 Jul 74	0	S	Bellevue, Tex. USA. Propeller blade (near blade shank).
F151	Beech J35 Bonanza	1 Jul 75	0	S	Sparta, Ky. USA. Prop blade pitch control bolts. P/N 278-336.
F164	Beech V35 Bonanza	30 Jan 76	2	D	Meigs, Ga. USA. No. 2 prop blade actuating pin.
F191	Beech S35 Bonanza	19 Mar 78	4	D	Carrabassett, Maine USA. 6 inches of propeller blade separated.
F199	Beech V35 Bonanza	4 Jun 78	0	S	East Jordan, Mich. USA. No. 2 blade actuating pin.
F201	Beech V35 Bonanza	11 Jun 78	0	S	Jackson Hole, Wy. USA. Prop. AD not complied with.
F222	Beech F33A Bonanza	1 Oct 80	0	S	Arlington, Az. USA. Propeller blade.
	Landing Gear				
G62	Beech 35 Bonanza	12 Jun 64	0	S	Piedmont, Okla. USA. Nosegear retract actuator arm.
G119	Beech B35 Bonanza	14 Jul 65	0	S	Carnegie, Okla. USA. Lower nose gear drag leg bolt.
G128	Beech 35-33 Bonanza	9 Sep 65	0	S	Omaha, Neb. USA. Nose gear hydraulic actuating cylinder shaft.
G212	Beech J35 Bonanza	31 May 67	0	S	Lufkin, Tex. USA. Nose gear push-pull rod end (threaded area).

G223	Beech A35 Bonanza	19 Nov 67	0	S	Visalia, Cal. USA. Nose gear actuator retract arm. P/N 35-825172-2.
G308	Beech 35 Bonanza	20 Jun 71	0	S	Golts, Md. USA. Nose wheel fork (weld). Operated from rough strip.
G367	Beech H35 Bonanza	6 Jan 74	0	S	Canyon, Tex. USA. Rebuilt nose gear brace assembly.

BEECH TWIN BONANZA

	Engine				
E35	Beechcraft C50	14 May 64	0	S	Concord, N.H. USA. High pressure fuel line.
	Propeller				
F63	Beech B50 Twin Bonanza	3 Nov 67	0	S	McAllen, Tex. USA. 6 1/2" broke off blade, left propeller.
	Landing Gear				
G165	Beech B50 Twin Bonanza	6 Apr 66	0	S	Jackson, Miss. USA. Nose gear jack screw mounting.
G201	Beech D50 Twin Bonanza	15 Mar 67	0	S	Birmingham, Ala. USA. Nose gear shimmy damper jammed, failed nose gear
G266	Beech E50 Twin Bonanza	1970	0	S	Katherine NT, Australia. Nose gear retract mechanism.

BEECH 60 DUKE

	Landing Gear				
G401	Beech 60A Duke	23 Jul 75	0	S	Duesseldorf, W. Germany. Wheel rim of left main landing gear.

BEECH 90 KING AIR

	Wing				
A124	Beech A90 King Air	1 May 79	2	D	Sherrington, Que. Canada. Right wing separated. Bathtub fitting, P/N 50110057, joining centre section to outer wing. Matl: 2014-T6. Role: low-level navaid calibration. Airframe hours: 5466
A137	Beech E90 King Air	26 Oct 81	1	D	Mineral Wells, Texas USA. Left wing separated. Lower-wing forward attachment bolt failed from fatigue corrosion.

BEECH MUSKETEER (SIERRA, SUNDOWNER, SPORT)

	Engine				
E147	Beech 23 Musketeer	16 May 71	0	S	Yuma, Ariz. USA. Aux fuel pump fitting (prior partial fracture).
E191	Beech A23 Musketeer	8 Apr 73	0	S	Eden Prairie, Minn. USA. Dowel pin, all starter gear and crankshaft gear attach bolts broken.

E220	Beech B24R	5 Oct 74	0	S	Wallkill, N.Y. USA. No. 3 conrod.
E325	Beech A24 Musketeer	1979	0	S	Marulan NSW, Australia. Piston pin (faulty manufacture).
E385	Beech A23-24	31 Mar 81	0	S	Sawyer, Ky. USA. No. 4 cylinder wall.

Propeller

F37	Beech A23 Musketeer	6 Jul 66	0	S	Boulder, Colo. USA. Propeller blade (improper blade).
F56	Beech A23 Musketeer	8 Jul 67	0	S	Aqua Dulce, Cal. USA. 19" of Sensenich propeller blade separated. AD not complied with.
F161	Beech A23A Musketeer	1976	1	D	Australia. Most of prop blade shed.
F184	Beech 23 Sundowner	25 Jun 77	0	S	Matane, Que. Canada. Prop blade failed 9" from end (undressed dent on leading edge).

Landing Gear

G96	Beech M-23 Musketeer	10 Jan 65	0	S	Lombard, Ill. USA. Right landing gear strut.
G149	Beech 23 Musketeer	14 Dec 65	0	S	Knoxville, Tenn. USA. Right gear at wing attach plate (improperly-fastened attach screws)
G154	Beech 23 Musketeer	8 Jan 66	0	S	Joliet, Ill. USA. Right main landing gear.
G254	Beech 23 Musketeer	16 May 69	0	S	Colts Neck, N.J. USA. Main landing gear.
G288	Beech 23 Musketeer	24 Nov 70	0	S	Davenport, Iowa. USA. Right main landing gear housing P/N 169-810011-21
G310	Beech A23 Musketeer	3 Jul 71	0	S	Joliet, Ill. USA. Right gear casting separated 2 1/2" below mounting thru bolt.

Miscellaneous

H14	Beech A23 Musketeer	5 Dec 67	0	S	Chamblee, Ga. USA. Both brake castings fractured. Struck parked Cessna 172 (substantial damage).

BEECH QUEEN AIR

Engine

E160	Beech 65-80 Queen Air	9 Dec 71	7	D	Oklahoma City, Okla. USA Left engine no. 5 conrod cap.
E265	Beech 65 Queen Air	27 Jul 76	0	S	Bedford, Ma. USA. Crankshaft (#3 counter wt hanger).

E287	Beech 65-80 Queen Air	13 Aug 77	3	D	Vancleave, Miss. USA. Crankshaft (crack at #5 connecting rod throw).
	Landing Gear				
G78	Beech 65-80 Queen Air	13 Sep 64	0	S	Seward AFB, Tenn. USA. Nose gear chain sprocket attach bolt.
G355	Beech 65-80 Queen Air	8 Aug 73	0	S	Chattanooga, Tenn. USA. Nose gear actuator assembly attach bolt. No evidence of bolt being changed.

BEECH 99 AIRLINER

	Propeller				
F105	Beech 99A Airliner	24 Nov 71	0	S	Greeley, Colo. USA. Right prop blade failed (improper machining in balance hole cavity).

BEECH 200 SUPER KING AIR

	Wing				
A128	Beech 200 Super King Air	22 Jan 80	0	S	Zanesville, Oh. USA. Fatigue fracture of lower forward wing attach bolt, PN LWB 22-16-44. Stress corrosion where CD plating scored.

BELLANCA 7ECA/7GCBC CITABRIA (See Champion Citabria)

BELLANCA 8GCBC SCOUT

	Landing Gear				
G530	Bellanca 8GCBC Scout	31 May 81	0	S	St Andre Avellin, Que. Canada. "U" bolt, left main gear.
	Tail				
B37	Bellanca 8	1981	0	S	Archerfield, Qld. Australia. Two elevator ribs failed. Aircraft landed safely.

BELLANCA 14-13 CRUISAIR

	Engine				
E36	Bellanca 14-13	14 Jul 64	0	S	North Creek, N.Y. USA. Crankshaft.
	Landing Gear				
G137	Bellanca 14-13	31 Oct 65	0	S	Somerset, Pa. USA. Left landing gear retract strut.
G172	Bellanca 14-13	7 May 66	0	S	Tony, Wis. USA. Welded fitting in right gear screw shaft assembly. P/N 9837.
G221	Bellanca 14-193	21 Oct 67	0	S	Kenner, La. USA. Right upper strut of nose gear assembly.

BELLANCA 14-19 CRUISEMASTER

	Engine				
E199	Bellanca 14-19	7 Sep 73	0	S	Hammondsport, N.Y. USA. No. 3 piston oil wiper ring, fractured at heel.

BELLANCA 17-30

Engine

E274	Bellanca 17-30A	24 Oct 76	2	D	Nakina, N.C. USA. Muffler-assembly ball joint cracked in weld area, causing burned ignition leads & engine failure.

BOEING/STEARMAN 75 KAYDET (PT-13, PT-17)

Engine

E39	Boeing 75N1 Stearman	19 Sep 64	0	S	Lepanto, Ark. USA. Crankshaft, next to front thrust bearing.
E44	Boeing PT-13 Stearman	15 Mar 65	0	S	Legrand, Cal. USA. Crankshaft at thread area of thrust bearing nut
E85	Boeing IB75A Stearman	23 Jul 66	1	D	Valparaiso, Ind. USA. Crankshaft. Prop shaft separated at thrust nut threads, prop hit wing brace & wing folded. Role: aerobatics.
E117	Boeing 75 Stearman	9 May 69	0	S	Five Points, Cal. USA. Crankshaft broken in thrust nut thread area.
E129	Boeing A75 Stearman	13 Jun 70	0	S	Sacramento, Cal. USA. No. 1 cylinder.
E208	Stearman A75	29 Mar 74	0	S	Pixley, Cal. USA. Crankshaft.
E281	Boeing A75-N1 Stearman	11 Jun 77	0	S	Sulphur, La. USA. No. 2 link rod of piston.

Propeller

F27	Boeing A75-N1 Stearman	8 Mar 65	1	D	Sherrill, Ark. USA. Propeller (blade retention mechanism)
F31	Boeing A75 Stearman	9 Jul 65	0	S	Homedale, Id. USA. Propeller blade (12" from tip).
F42	Boeing A75 Stearman	14 Aug 66	0	D	Dos Palos, Calif. USA. Propeller blade. Role: spraying.
F44	Boeing A75 Stearman	2 Sep 66	0	S	Gustine, Cal. USA. Blade in shank area (unapproved blades).
F50	Boeing 75N1 Stearman	30 Mar 67	0	D	McKittrick, Calif. USA. Propeller blade. Role crop control.
F59	Boeing B75N1 Stearman	16 Oct 67	0	D	Gilliam. La. USA. Propeller blade. Role crop seeding.
F77	Boeing A75N1 Stearman	11 Jul 69	0	S	West Point, Miss. USA. 16" of blade separated.
F78	Boeing 75 Stearman	16 Jul 69	0	S	Hilmar, Cal. USA. Propeller.

F82	Boeing 75 Stearman	16 Aug 69	0	S	Los Banos, Cal. USA. Blade broke 5" from butt end.
F104	Boeing A75 Stearman	10 Nov 71	0	S	Holtville, Cal. USA. Piece of propeller blade shed.
F140	Boeing A75 Stearman	27 Sep 74	0	S	Dos Palos, Cal. USA. Propeller blade (3" from butt end).
F150	Boeing A75L3 Stearman	26 Jun 75	0	S	Hickman, Cal. USA. Blade separated 5" from butt end.
F176	Boeing A75 Stearman	18 Sep 76	1	D	Parlier, Calif. USA. Propeller blade broke 5 in. from butt. Role: aerial application.
	Landing Gear				
G81	Boeing E75 Stearman	7 Oct 64	0	S	Bakersfield, Cal. USA. Landing gear strut at upper sleeve.
G259	Boeing E75 Stearman	5 Sep 69	0	S	Orange, Tex. USA. Right gear.
G489	Boeing PT-17	13 Sep 79	0	S	Shreveport, La. USA. Left main gear.
	Engine Mount				
H8	Boeing E-75 Stearman	12 Jul 64	0	S	Sherbrooke, Que. Canada. Engine attachment bolts.
H9	Boeing E75N1 Stearman	13 Jul 64	0	S	Mercedes, Tex. USA. Engine tearaway. Engine structure: mount and vibration isolators.

BOEING B-17

	Wing				
A119	Boeing B-17G	17 Aug 76	0	S	Cordele, Ga. USA. Left front spar, lower cap centre section, P/N 753424-2 cracked. 1/2" outboard of inboard bolt of aft terminal plate, 8" inboard of inboard jack pad. Airframe hours: 5546. Role: spraying. Aircraft landed safely.
	Landing Gear				
G55	Boeing B-17G	27 Apr 64	0	S	Marana, Ariz. USA. Left gear drag strut terminal fitting.

BOEING B-47 STRATOJET

	Wing				
A53	Boeing B-47 Stratojet (USAF)	1958	3?	D	USA. Wing separation. Longeron failure. Role: Low Altitude Bombing System.
A54	Boeing B-47 Stratojet (USAF)	1958	3?	D	USA. Wing separation. Longeron failure. Role: Low Altitude Bombing System.

A55	Boeing B-47 Stratojet (USAF)	1958	3?	D	''SA. Wing separation. Longeron failure. Role: Low Altitude Bombing System.
	Fuselage				
C2	Boeing B-47 Stratojet (USAF)	1953-59	?	?	? Fuselage failure.

BOEING B-52 STRATOFORTRESS

	Wing				
A39	Boeing B-52 Stratofortress (USAF)	1953-59	?	?	? Wing failure.
A40	Boeing B-52 Stratofortress (USAF)	1953-59	?	?	? Wing failure.
A60	Boeing B-52	1961?	?	D	USA? Wing failure.
	Fuselage				
C10	Boeing B-52 Stratofortress (USAF)	19 Jan 61	8?	D	Monticello, Utah USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude
C11	Boeing B-52 Stratofortress (USAF)	24 Jan 63	8?	D	Little Shanty Mountain, Maine USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude
C12	Boeing B-52 Stratofortress (USAF)	30 Jan 63	8?	D	Mora, New Mexico USA. Aft fuselage just forward of vertical stabilizer. Role: low altitude

BOEING 377 STRATOCRUISER

	Propeller				
F6	Boeing 377 Stratocruiser	29 Apr 52	50	D	Carolina, Brazil. Propeller failure caused separation of no. 2 engine.
F9	Boeing 377 Stratocruiser	26 Mar 55	4	D	Off Oregon coast, USA. No. 3 engine tore loose after propeller failure. Hamilton-Standard 2J17 propeller.

BOEING 707/720

	Tail				
B14	Boeing 707-436	5 Mar 66	124	D	Mt. Fuji, Japan. Vertical stabilizer separated. Gust load considerably in excess of design limit. Fatigue cracks in vertical stabilizer rear spar, starboard attachment fitting (bolt holes). 19,532 hours. Tests on similar fitting with cracks failed at 110% limit design load.
B28	Boeing 707 321C	14 May 77	6	D	Lusaka, Zambia. Separation of right horizontal stabilizer & elevator. Stabilizer rear top chord. Airframe hours: 47,621.

	Fuselage				
C20	Boeing 707-349C	24 Sep 70	0	S	Enroute Shannon/London Loss of pressurization, fatigue of portion of external main cargo door skin.
	Flight Controls				
D20	Boeing 707	26 Jul 69	5	D	Pomona, N.J. USA. Hydraulic system, port outboard spoiler downline. Loss of fluid in control system for rudder & rudder tab caused loss of directional control. Role: Training.
	Engine				
E26	Boeing 720	1 Feb 62	0	S	Portland, Ore. USA. Third stage compressor blades. Origin: trailing edge corner of dovetail on convex side of blade
E50	Boeing 720B	3 May 65	0	S	Los Angeles, Cal. USA. No. 2 engine 2nd stage fan disc. Spacer hole, P/N 421602.
E75	Boeing 720	13 Feb 66	0	S	Dallas, Tex. USA. Turbine spacer, wheel.
E102	Boeing 707-465	8 Apr 68	5	D	Heathrow Airport, London England. No. 5 low pressure compressor wheel.
E132	Boeing 707	22 Jun 70	0	S	London, UK. Disk diaphragm at runout of outboard radius of front integral spacer (8th stage HP compressor, no. 1 engine). Disk hours: 15,157.
E149	Boeing 707	21 Jul 71	0	S	Dallas, Tex. USA. No. 3 engine (P&W JT-3D), segment of no. 1 fan disk.
E186	Boeing 707	20 Jan 73	0	S	Elk Grove Village, Ill. USA. 3rd stage nozzle vane retaining lugs, no. 4 engine (fretting).
	Engine Pylon				
H26	Boeing 707-100	5 Apr 77	0	S	St. Louis, Mo. USA. No. 3 pylon mid-spar attachment fitting. Pylon and engine separated.
	Landing Gear				
G14	Boeing 707	12 Jul 59	0	S	New York, USA. 2 front wheels of left main gear separated. Origin: peen mark made by contact between truck beam & anti-rotation bolt.
G87	Boeing 720	5 Nov 64	0	S	San Francisco, Cal. USA. Nose gear drag brace lockrod upper attach bolt, P/N BACB30ABP 6-37.
G90	Boeing 707-123B	12 Nov 64	0	S	Nashville, Tenn. USA. Nos. 5-6 axle section near inner bearing brake collar. 16,000 hours on part.

G112	Boeing 707-120	11 May 65	0	S	El Paso, Tex. USA. No. 7 wheel, axle failed at brake journal.
G343	Boeing 707-320	1973	0	S	Sydney NSW, Australia. Left main gear trunnion support rib (inboard flange rear fastener hole). 16,933 landings.
G350	Boeing 707	9 Apr 73	0	S	Miami, Fla. USA. Nose gear outer cylinder. Origin: pre-existing stress corrosion crack.
G394	Boeing 707	18 Feb 75	0	S	Longview, Tex. USA. Nosewheel outer cylinder improperly machined.
G529	Boeing 707	11 May 81	0	S	Kilgali/Kanombe Airport, Rwanda. Nose gear shaft. Stress-corrosion & fatigue crack. Origin: corrosion pit at bore of shaft.

BOEING 727

Engine

E130	Boeing 727	16 Jun 70	0	S	Boston, Mass. USA. Compressor disc, 11th stage. P/N 496911R.
E247	Boeing 727-200	17 Sep 75	0	S	Tokyo, Japan. Welding parts (Ps4) of combustion chamber outer case. Origin: pitting corrosion.

Landing Gear

G280	Boeing 727	28 Sep 70	0	S	Las Mercedes Airport, Managua, Nicaragua. Rear support of actuating link, left-gear door.
G282	Boeing 727	4 Nov 70	0	S	Savannah, Ga. USA. Right main landing gear aft trunnion support beam. P/N 65-16230-16.
G291	Boeing 727	16 Dec 70	0	S	Burbank, Cal. USA. Left main landing gear trunnion beam at bearing hole.
G304	Boeing 727	26 Feb 71	0	S	St. Louis, Mo. USA. Left gear trunnion support beam (attach hole).
G335	Boeing 727	1 Oct 72	0	S	San Francisco, Cal. USA. Stress corrosion and fatigue, front trunnion bearing support fitting.
G392	Boeing 727-227	1975	0	S	Sydney NSW, Australia. Port main gear (trunnion). Groove machined in during manufacture.
G404	Boeing 727	23 Aug 75	0	S	Buffalo, N.Y. USA. Link assembly trunnion of left main gear.
G468	Boeing 727	7 Aug 79	0	S	El Paso, Tex. USA. Down-lock rod, PN 69-33654-4.

G520	Boeing 727	31 Jan 81	0	S	Flushing, N.Y. USA. Fatigue fracture of reworked trunnion link, P/N 65-57904-18, at stress corrosion area.

BOEING 737

	Landing Gear				
G487	Boeing 737-100	18 Aug 79	0	S	Dillingham, Ak. USA. Port lower drag strut bolt, PN 69-39473-2. Intergranular corrosion from worn chrome plating. Corrosion and fatigue fracture.

BOEING 747

	Flaps				
D26	Boeing 747-136	16 May 75	0	?	Prestwick, Scotland. Right inboard wing trailing edge foreflap detached. Crack in outboard sequence carriage attachment fitting at horiz flange. 13,732 airframe hours, 5507 landings.
D36	Boeing 747SR-100	11 Nov 78	0	S	Osaka, Japan. Flap track bolts of right outer trailing edge flap.
	Engine				
E156	Boeing 747	8 Nov 71	0	S	Jamaica, N.Y. USA. No. 1 engine diffuser case near the no. 5 boroscope boss.
	Landing Gear				
G413	Boeing 747	8 Nov 75	0	S	Bombay, India. Inner hub, no. 8 main wheel.
	Engine Pylon				
H34	Boeing 747-121	27 Dec 79	0	S	Heathrow Airport, London England. Pylon forward bulkhead of #4 engine. 2.5 inch crack on Inconel horse collar chord. 34,615 hours. Forward bulkhead pulled out of pylon. Initiated maybe from prior collision with baggage container.

BOLKOW 208

	Landing Gear				
G313	Bolkow 208	29 Aug 71	0	S	Rotorua Airport, New Zealand. Nose leg outer tube.

BOWERS FLY BABY

	Wing				
A99	Bowers Fly Baby 1-A	20 May 71	0	D	Oxford, Conn. USA. Left wing failure. Flying-wire turnbuckle failed. Pilot parachuted.

BRISTOL BRITANNIA

	Landing Gear				
G25	Bristol Brittania	11 Nov 60	0	S	Khartoum, Sudan. Support member for starboard main gear uplock.

BRISTOL 170 WAYFARER/FREIGHTER

Wing

A43	Bristol 170 Freighter (RAAF)	25 Nov 53	2	D	Mallala, South Australia. Wing failure in high-load high-speed manoeuvre. Fatigue crack reduced strength below design strength, but not necessarily below limit strength. Lower surface of torsion box on joint between rear lower skin angle and inter-span skin.
A47	Bristol 170 Wayfarer	5 Feb 55	13	D	Lagos, Nigeria. Left wing failure, doubler plate of spar.
A51	Bristol 170 Freighter	21 Nov 57	4	D	Christchurch, New Zealand. Wing failure. Lower boom of starboard outer wing, front spar joint at last bolt hole. Matl: DTD 364 (equiv 24ST). Airframe hours: 7900.

BRITISH AEROSPACE BUCCANEER

Wing

A125	British Aerospace Buccaneer (RAF)	12 Jul 79	2	D	Osnabruck, W. Germany. Wing separated. Main spar latch pin, wing-fold joint.
A130	British Aerospace Buccaneer S.2B (RAF)	7 Feb 80	2	D	Nellis AFB, Nevada, USA. Right wing failure. Mainplane inner-front spar.

BRITTEN-NORMAN ISLANDER

Landing Gear

G494	Britten-Norman BN-2A Islander	6 Feb 80	0	S	Mont Joli, Que. Canada. Left oleo scissor link pin bolt. Exceeded 50-hour inspection.
G542	Britten-Norman BN-2A Islander	20 Sep 82	0	S	Sable Island, N.S. Canada. Bulkhead to which nosegear was attached.

BRITTEN-NORMAN TRISLANDER

Propeller

F179	Britten-Norman BN2A-8 Trislander	14 Jan 77	0	S	St. Thomas, Virgin Islands. Propeller blade.

BUCKER JUNG BU-131

Engine

E399	Bucker Jung 1.131	3 Oct 81	2	D	Baltimore, Md. USA. Crankshaft. Rear cone of prop hub not installed.

Propeller

F220	Bucker Jung BU-131	4 May 80	0	S	Colwich, Ks. USA. Fatigue fracture of prop, EN4 ST-21. Corrosion discoloration present.

BUSHBY/LONG MIDGET MUSTANG

Propeller

F207	Midget Mustang	27 Dec 78	0	S	Prescott, Ariz. USA. 13" of # 1 blade shed. Dent in leading edge.

C.A.C. CA-28 CERES (See Commonwealth CA-28 Ceres)

CALLAIR A-5

Tail

B12	CallAir A-5T	24 Aug 64	0	S	Bainbridge, Ga. USA. Left stabilizer attach tube.

CALLAIR A-9

Flight Controls

D14	CallAir A-9	16 Aug 67	1	D	Knobel, Arkansas USA. Fracture of right rudder cable, which was chafing against off-centre fairlead. Role: aerial application.

Engine

E94	CallAir A-9	8 Jun 67	0	D	Belvidere, S. Dakota USA. Outlet connector at fuel selector failed. Role: Crop spraying.
E113	Aero Commander A-9B	8 Mar 69	0	S	Selma, Cal. USA. Crankshaft at no. 5 crankpin.
E146	Aero Commander A-9B	16 Apr 71	0	D	Purvis, Miss. USA. No. 5 conrod. Role: Spraying.
E157	Aero Commander A-9B	10 Nov 71	0	S	Elmira, Cal. USA. Forward fillet of # 3 main journal of crankshaft, P/N 45075-77.
E188	Aero Commander A-9B	19 Feb 73	0	S	Sunnymead, Cal. USA. Crankshaft.
E206	CallAir A-9B	14 Mar 74	0	S	Calexico, Cal. USA. No. 5 connecting rod.

Propeller

F139	CallAir A-9	5 Sep 74	0	D	Amarillo, Texas USA. Propeller blade. Role: crop spraying.

CANADAIR CL-41 TUTOR

Tail

B31	Canadair CL-41 Tutor (Canadian Forces)	3 May 78	1	D	Grande Prairie, Alta. Canada. Horizontal stabilizer separated. Crack at corner in stabilizer rear attachment fitting. Snowbird aerobatic team. Material: 7075-T6

CANADAIR CL-44

Landing Gear

G89	Canadair CL-44	12 Nov 64	0	S	Detroit, Mich. USA. Left main gear uplock actuator cylinder, P/N 28-75001.

G277	Canadair CL-44J	30 Apr 70	0	S	New York, N.Y. USA. Mounting lug of left main gear actuating mounting bracket (at bolt hole). 14,120 hours.
G387	Canadair CL-44	22 Dec 74	0	S	Lusaka, Zambia. Nose gear radius rod.

CANADAIR CL-84

	Gearbox				
E196	Canadair CL-84 Dynavert	8 Aug 73	0	D	Patuxtent, Md. USA. Gear broke in prop gearbox. 123 hours on part.

CENTRE EST (See Robin)

CESSNA T-50 CRANE

	Engine				
E16	Cessna T-50	4 Apr 59	0	S	Kasigluk, Alaska, USA. Crankshaft, next to rear side of propeller thrust nut.

CESSNA 120

	Engine				
E167	Cessna 120	19 Apr 72	0	S	Watervliet, Mich. USA. Carburetor butterfly valve.
	Propeller				
F107	Cessna 120	13 Feb 72	0	S	Beaumont, Kans. USA. Propeller blade.
	Landing Gear				
G219	Cessna 120	6 Sep 67	0	S	Pekin, Ill. USA. Left gear at bolt hole holding step
G272	Cessna 120	2 Mar 70	0	S	Gaithersburg, Md. USA. Right landing gear support bracket.
G284	Cessna 120	8 Nov 70	0	S	Lowell, Mich. USA. Right axle.

CESSNA 140

	Wing				
A48	Cessna 140	1956	?	D	USA. Wing failure. Lift strut fitting.
	Engine				
E47	Cessna 140	14 Apr 65	0	S	Tulsa, Okla. USA. No. 2 cylinder.
E87	Cessna 140A	25 Aug 66	0	S	Sikes, La. USA. No. 3 cylinder exhaust valve.
	Landing Gear				
G45	Cessna 140	9 Feb 64	0	D	Gainesville, Florida USA. Fracture at step plate bolt hole of main gear.
G77	Cessna 140	11 Sep 64	0	S	Chicago, Ill. USA. Right gear strut at wedges.
G83	Cessna 140	20 Oct 64	0	S	Horn Lake, Miss. USA. Main gear (strut saddle showed old crack).

G99	Cessna 140	24 Jan 65	0	S	Fort Lauderdale, Fla. USA. Left main gear axle.
G211	Cessna 140	30 May 67	0	S	North Kingstown, R.I. USA. Left landing gear.
G215	Cessna 140A	1 Jul 67	0	S	North Canton, Ohio. USA. Landing gear (bolt hole at step attach point).
G261	Cessna 140	24 Oct 69	0	S	Flint, Mich. USA. Right gear at step assembly attach point
G263	Cessna 140	17 Dec 69	0	S	Sand Springs, Okla. USA. Left wheel fell off (broken axle).
G423	Cessna 140	10 Feb 76	0	S	Vankleek Hill, Ont. Canada. Left ski axle.
G504	Cessna 140A	30 Apr 80	0	S	Atlanta, Ga. USA. Right main landing gear spring, P/N 0441149-1.
G539	Cessna 140	19 Nov 81	0	S	Barrett Lake, Ca. USA. Right main gear strut P/N 044-1149-1 at step attach upper bolt hole.
G541	Cessna 140 (on skis)	22 Jan 82	0	S	Kajaani, Finland. Left landing gear.

CESSNA 150

	Tail				
B11	Cessna 150	4 Nov 62	0	D	Prince Albert, Sask. Canada. Bottom flange of rudder spar. Origin: bend radius of flange. Role: aerobatics.
B16	Cessna 150	12 Dec 68	0	S	North Iliamna, Alas. USA. Rudder at vertical spar.
B33	Cessna 150	9 Oct 78	0	S	Hamilton, Ont. Canada. Horizontal stabilizer, attachments. 5901 airframe hours.
	Engine				
E72	Cessna 150F	22 Jan 66	0	S	West Los Angeles, Cal. USA. No. 1 connecting rod.
E101	Cessna 150F	7 Mar 68	0	S	Findo-Gask, Perthshire, UK. Engine cylinder.
E110	Cessna 150G	1969	0	S	King Is Ad, Tas. Australia. Exhaust valve rocker arm.
E134	Cessna 150	13 Jul 70	0	S	Deer Park, N.Y. USA. Crankshaft broke at no. 4 web above journal.
E213	Cessna 150	31 Jul 74	0	S	Cobble Hill, BC, Canada. No. 1 cylinder exhaust valve.

E242	Cessna 150F	16 Aug 75	0	S	Jean, Nev. USA. Mixture control wire came loose at carburetor.
E271	Reims Avion F-150L	7 Sep 76	0	S	Tuensdorf, West Germany. Connecting-rod bearing damaged as a result of loss of oil through a broken dump valve.
E319	Cessna 150L	17 Sep 78	0	S	Strathlorne, N.S. Canada. Continental O-200 engine. #4 connecting rod cap (outer corners of oil scavenge hole).
E329	Cessna 150	27 Feb 79	0	S	Anchorage, Alas. USA. Head of # 3 cylinder.
E335	Cessna 150	27 May 79	0	S	Turku, Finland. Engine cylinder.
E366	Cessna 150	5 Sep 80	0	S	Wellandport, Ont. Canada. Continental O-200 engine. No. 3 cylinder rocker shaft support.
E380	Cessna 150M	18 Feb 81	0	S	Eudora, Ks. USA. No. 4 cylinder at 5th cooling fin from mounting flange.
E390	Cessna 150	5 Jul 81	0	S	Georgetown, Ca. USA. Mixture control bracket (outside the weld on exhaust cross-over brace).
E401	Cessna A150L	11 Oct 81	1	D	Oak Ridge, Tn. USA. No. 4 cylinder, P/N 50222, under chrome plating.
	Propeller				
F55	Cessna 150	29 Jun 67	0	S	Naperville, Ill. USA. 6" of tip of blade separated (stone damage).
F75	Cessna 150F	23 Oct 68	0	S	Bedford, Mass. USA. 4" missing from tip of blade.
F81	Cessna 150F	11 Aug 69	0	S	Louisville, Miss. USA. Spinner bulkhead.
F135	Cessna 150	28 Jul 74	0	S	Erin, Ont. Canada. Propeller.
F212	Cessna 150	6 Jul 79	0	S	Milwaukee, Wis. USA. Propeller missing 5" of blade tip. McCauley model 1A100/MCM.
F216	Cessna 150	1980	0	S	Wiluna, WA, Australia. 14 cm of prop blade shed (stone damage).
F218	Cessna 150 Super	23 Feb 80	0	S	Joensuu Airport, Finland. Propeller blade.

Landing Gear

G30	Cessna 150	2 Jun 61	0	S	Vancouver, B.C. Canada. Left gear leg (steel) 8 inches from fuselage attachment. Fretting.
G58	Cessna 150A	2 May 64	0	S	Boca Raton, Fla. USA. Nose gear fork.
G92	Cessna 150	22 Nov 64	0	S	Agawam, Mass. USA. Left gear spring assembly.
G117	Cessna 150	6 Jul 65	0	S	Whitehouse, N.J. USA. Nose gear fork.
G134	Cessna 150	16 Oct 65	0	S	West Chester, Pa. USA. Left gear spring assembly.
G148	Cessna 150E	14 Dec 65	0	S	Ronkonkoma, N.Y. USA. Nose gear steering tube assembly rod end bearing.
G157	Cessna 150	17 Feb 66	0	S	Hot Springs, Ark. USA. Nose gear mounting bracket.
G202	Cessna 150	19 Mar 67	0	S	Blytheville, Ark. USA. Left trunnion bolt.
G233	Cessna 150	14 May 68	0	S	Jacksonville, Ark. USA. 2 broken diagonal members holding upper nose gear retaining collar in place.
G234	Cessna 150	15 May 68	0	D	Montgomery, Ala. USA. Nosewheel landing gear, cracks on left & right side of nose wheel fork.
G248	Cessna 150E	10 Feb 69	0	S	Johnson, Kans. USA. Landing gear, nosewheel assemblies. Commonly used on rough strips.
G258	Cessna 150	23 Aug 69	0	S	San Bernardino, Cal. USA. Landing gear (nosewheel assemblies).
G273	Cessna 150G	23 Mar 70	0	S	Archer, Fla. USA. Nosewheel strut support tubes.
G360	Cessna 150E	27 Sep 73	0	S	Kirchheim-Teck, W. Germany. Main landing gear strut attachment (sharp notch).
G515	Cessna 150	27 Nov 80	0	S	Alma, Que. Canada. Nosewheel fork collar (bolt holes). 5000 hours since new.

CESSNA 170 (L-19)

Flight Controls

D7	Cessna 170	4 Oct 64	0	S	Effingham, Ill. USA. Left rudder cable.

Engine

E53	Cessna TL-19D	15 Jun 65	0	S	Almyra, Ark. USA. Fuel mixture control arm.
E65	Cessna 170B	13 Oct 65	0	S	Silverdale, Wash. USA. Valve assemblies, fatigue fracture. Exhaust valve burned, spark plugs excessively worn.
E128	Cessna 170A	6 Jun 70	0	S	Greenfield, Ind. USA. No. 4 connecting rod.

Landing Gear

G27	Cessna 170A	9 Jan 61	0	S	St. Francois de Montmagny, Que. Canada. Right gear leg (2 top axle attachment holes). Spring steel.
G48	Cessna 170	1 Mar 64	0	S	Oklahoma City, Okla. USA. Gear collapsed.
G86	Cessna 170	25 Oct 64	0	S	Marshland, Neb. USA. Landing gear. Fatigue nucleus at radius - improper machining.
G193	Cessna 170B	13 Oct 66	0	S	Shelby, Miss. USA. Right main wheel axle separated at radius of axle to flange mount.
G216	Cessna 170	22 Jul 67	0	S	Miltonvale, Kans. USA. Left landing gear axle.
G305	Cessna 170A	4 Mar 71	0	S	Leclaire, Iowa. USA. Right wheel axle.
G329	Cessna 170	17 Jul 72	0	S	Chugiak, Alas. USA. Landing gear.
G399	Cessna 170	14 Jun 75	0	S	Calgary, Alta. Canada. Left wheel axle.
G451	Cessna 170A	30 Oct 77	0	S	Bielefeld-Wdbl., W. Germany. Axle of left main landing gear wheel.
G513	Cessna 170	4 Oct 80	0	S	Wright, Wy. USA. Right landing gear axle.
G533	Cessna 170	3 Aug 81	0	S	Middle Lake, Sask. Canada. Left axle. Machining marks in axle-flange fillet.

CESSNA 172 SKYHAWK

Flight Controls

D11	Cessna 172G	26 Dec 65	0	S	Streator, Ill. USA. Left aileron push-pull rod.

D21	Cessna 172	17 Jan 71	0	S	Claypool, Ind. USA. Right aileron push-pull rod assembly P/N 053218-2 broken.
D31	Cessna 172	3 Jun 77	0	S	Basking Ridge, N.J. USA. Flap switch, down to neutral position spring broken.

Engine

E83	Cessna 172	3 Jul 66	0	S	Huntsville, Ont. Canada. No. 1 cylinder barrel between 6th and 7th cooling fins.
E151	Cessna 172C	7 Aug 71	0	S	Elmo, Pa. USA. Engine mixture control wire (2 in. from control arm attach point).
E179	Cessna 172B	11 Nov 72	0	S	Marton, New Zealand. No. 5 cylinder at base, in region of nos. 1 & 3 cooling fins.
E218	Reims Avion F 172H	15 Sep 74	0	D	Letmathe-Loessel, W. Germany. Connecting rod.
E231	Cessna 172L	3 Jun 75	0	S	Mt. Sterling, Ill. USA. Stepped dowel pin P/N STD-1065.
E286	Cessna 172	11 Aug 77	0	S	Pelican Lake, B.C. Canada. Fractured oil line. Continental O-300 engine.
E304	Cessna 172A	4 Jun 78	0	S	Trail, B.C. Canada. Continental C-145 engine. # 2 cylinder 1" below top of barrel. Origin: surface laps & seams due to rough machining.
E305	Cessna 172	9 Jun 78	0	S	La Conception, Que. Canada. Avco Lycoming O-320 engine. #3 exhaust valve assembly.
E330	Cessna 172	15 Mar 79	0	S	Cedar Key Airport, Fla. USA. Continental O-300 engine. # 3 cylinder barrel. Origin: Corrosion pits on outer surface of barrel between cowling fins.
E340	Cessna 172K	30 Aug 79	0	S	Hopewell, Va. USA. Crankshaft.
E349	Cessna 172	6 Feb 80	0	S	Bruce, Wi. USA. Oil pump drive gear shaft, P/N 634010.
E403	Cessna 172K	27 Dec 81	0	D	Laguna Beach, Ca. USA. Mixture control wire failed (constant bending). Clamp bolt would not rotate.

Propeller

F89	Cessna 172K	8 Aug 70	0	S	Homer, La. USA. Approx. 6" prop tip missing (blade nick).

F94	Cessna 172	1 May 71	0	S	Beaver Falls, Pa. USA. Prop blade near tip.
F115	Cessna 172	29 Sep 72	0	S	Clinton, Mich. USA. Propeller blade.
F121	Cessna 172K	6 Apr 73	0	S	Oceanside, Cal. USA. Propeller blade (8" from tip).
F203	Cessna 172L	6 Aug 78	0	S	Skwentna, Ak. USA. Propeller blade.
F228	Cessna 172P	1 Jul 81	0	S	Thief River Falls, Mn. USA. McCauley Model 1C160/DTM propeller, failed 12" from hub centre line (trailing edge nick).
	Landing Gear				
G61	Cessna 172	22 May 64	0	S	Alachua, Fla. USA. Nose wheel fork, P/N SK182-17.
G100	Cessna 172	25 Jan 65	0	S	Kansas City, Mo. USA. Nose wheel fork.
G106	Cessna 172A	13 Mar 65	0	S	Jacksonville, Ill. USA. Nose gear fork.
G107	Cessna 172	26 Mar 65	0	S	San Antonio, Tex. USA. Nose wheel fork.
G142	Cessna 172	13 Nov 65	0	S	College Park, Md. USA. Nose gear attach fitting.
G147	Cessna 172	11 Dec 65	0	S	Gaithersburg, Md. USA. Nose gear fork.
G175	Cessna 172	21 Jun 66	0	S	High Point, N.C. USA. Nose wheel fork. P/N SK 182-34.
G220	Cessna 172	14 Oct 67	0	S	Salem, Ind. USA. Nose wheel fork.
G278	Cessna 172	28 Jun 70	0	S	Lodi, Cal. USA. Nose wheel fork at sides of strut attach point.
G371	Cessna F172	4 Apr 74	0	S	Iisalmi, Finland. Torque link bolt of ski nose landing gear.
G380	Cessna 172E	25 Jul 74	0	S	Fremont, Neb. USA. Nose gear scissors assembly.
G386	Cessna 172	2 Nov 74	0	S	Richland, Wash. USA. Left gear 14" above axle, at spot weld at pilot's assist step.
G422	Cessna 172	7 Feb 76	0	S	Gananoque, Ont. Canada. Left main gear leg.

G429	Cessna 172	31 May 76	0	S	Deerfield Beach, Fla. USA. Main landing gear, P/N S2138-1.
G532	Cessna 172N	30 Jul 81	0	S	Glenville, W.V. USA. Main landing gear attachment bolt, PN S2138-1.

CESSNA 175 SKYLARK

	Engine				
E42	Cessna 175	6 Feb 65	0	S	Brawley, Cal. USA. Crankshaft.
E243	Cessna 175	17 Aug 75	0	S	Kenora, Ont. Canada. No. 5 cylinder.
	Landing Gear				
G80	Cessna 175	24 Sep 64	0	S	Blackfoot, Id. USA. Nose wheel fork cracked by previous damage.
G88	Cessna 175	8 Nov 64	0	S	Wilmington, Ohio. USA. Landing gear spring leaf broke (improper weld).
G227	Cessna 175	15 Jan 68	0	S	Williams Lake, B.C. Canada. Nose wheel fork at fork attachment bolt lug fillets (wheel shimmy).

CESSNA 177 CARDINAL

	Engine				
E122	Cessna 177	1970	0	S	Randalls Bay, Tas., Australia. Oil line failed due not modified type.
E408	Cessna 177	29 Aug 82	0	S	Midnapore, Alta. Canada. Gearing failure in oil pump.
	Propeller				
F154	Cessna 177 Cardinal	18 Jul 75	0	D	Cambridge Narrows, N.B. Canada. Several inches of prop shed (nick).
F155	Cessna 177B	20 Jul 75	0	S	Aledo, Ill. USA. Propeller at file marks repairing previous damage.
F202	Cessna 177	2 Aug 78	0	S	Eagle River, Wis. USA. Propeller blade (gouge 8" from tip).
	Landing Gear				
G460	Cessna 177	12 Apr 78	0	S	Hartford, Conn. USA. Left main gear bolt P/N AN176H24A.

CESSNA 180 SKYWAGON

	Wing				
A58	Cessna 180	1 Mar 60	1	D	Mendip Hills, New Zealand. Wing failure. Starboard rear spar (root end). Crack probably initiated in ground-loop 3 months previously. Role: agricultural fertilizing. Airframe hours: 1813.
	Engine				
E62	Cessna 180B	27 Sep 65	1	D	Lake Corneau, Que. Canada. No. 2 piston.

E291	Cessna 180 Skywagon	28 Aug 77	0	S	High Level, Alta. Canada. Camshaft gear teeth (rough machining).
E383	Cessna 180	14 Mar 81	0	S	Shishmaref, Ak. USA. No. 5 cylinder, PN 625859, failed in threaded area near cylinder head.
E391	Cessna 180 Skywagon	11 Jul 81	0	D	Lake Margane, Que. Canada. Crankshaft. Subsurface initiation.
	Propeller				
F11	Cessna 180	22 Nov 61	1	D	Mangakino, New Zealand. Propeller blade separated. Crack on inside of clamp of propeller blade. Role: fertiliziing.
F24	Cessna 180	3 Jan 65	0	S	Burns, Ore. USA. Propeller blade (threads).
F40	Cessna 180	24 Jul 66	0	S	Athabasca, Alta. Canada. 5 1/2 inches of no. 1 blade shed (nick).
F87	Cessna 180G	1970	0	S	Parkes, NSW, Australia. 9 in. of prop blade shed (nick).
F88	Cessna 180	29 Jun 70	0	S	Bumpy Lake, Ont. Canada. Propeller.
F144	Cessna 180	25 Apr 75	0	S	Jackson, Wy. USA. Propeller blade (at tip). Blade shortened 1". File marks on blade.
F214	Cessna 180 Skywagon	19 Aug 79	0	S	Atlin Lake, B.C. Canada. Blade broke at hub attachment (threads). McCauley constant speed prop.
	Landing Gear				
G12	Cessna 180 (on skis)	24 Apr 59	0	S	Martin Lake, Sask. Canada. Right gear leg at bolt holes. (Spring steel).
G13	Cessna 180 (wheel-ski)	13 May 59	0	S	Point Barrow, Alaska USA. Starboard landing gear strut at bolt holes at wheel attachment end.
G15	Cessna 180	31 Aug 59	0	S	Athabasca, Alta. Canada. Right gear leg at two top bolt holes.
G17	Cessna 180 (on skis)	9 Dec 59	0	S	Beaverhill Lake, Man. Canada. Right gear leg at top two bolt holes where ski axle is attached.
G26	Cessna 180	24 Nov 60	0	S	Wheatcroft Lake, Man. Canada. Left gear leg (upper two bolt holes).
G33	Cessna 180	8 Dec 61	0	S	Red Lake, Ont. Canada. Right gear leg (2 upper bolt holes).

G47	Cessna 180	24 Feb 64	0	S	Red Bay, Lab. Canada. Left spring leg at upper bolt holes.
G71	Cessna 180	29 Aug 64	0	S	Aberdeen, Md. USA. Right gear attach bolt, P/N AN 7 20A.
G110	Cessna 180	7 May 65	0	S	Tuktoyaktuk, NWT. Canada. Left spring leg at upper axle attachment holes.
G146	Cessna 180	29 Nov 65	0	S	Fort McMurray, Alta. Canada. Right leg (top front bolt hole).
G155	Cessna 180	14 Jan 66	0	S	Reno, Nev. USA. Tail wheel steering mechanism.
G167	Cessna 180B	21 Apr 66	0	S	Whitehorse, Y.T. Canada. Right gear leg (top axle attachment holes).
G176	Cessna 180	23 Jun 66	0	S	Prince George, B.C. Canada. Right wheel brake disc retaining clips.
G181	Cessna 180A	3 Aug 66	0	S	Moberly Lake, B.C. Canada. Right gear leg immediately above axle upper attachment bolt holes. (Fretting).
G187	Cessna 180	6 Sep 66	0	S	Tarentum, Pa. USA. Left gear attach bolt.
G206	Cessna 180	16 Apr 67	0	S	Monticello, Ut. USA. Tail wheel spring.
G207	Cessna 180F (ski-wheel)	17 Apr 67	0	S	Twin Falls, Labrador. Canada. Right gear leg at upper forward wheel attachment bolt hole.
G228	Cessna 180	25 Feb 68	0	S	Peace River Airport, Alta. Canada. Tail wheel torque tube at forward bolt holes inside the servo casting.
G270	Cessna 180 (skis)	9 Feb 70	0	S	Bathurst Inlet, NWT. Canada. Left gear leg at wheel axle upper attachment bolt hole.
G276	Cessna 180A (ski/wheels)	23 Apr 70	0	S	Inuvik, NWT. Canada. Right gear leg at axle attachment upper bolt holes.
G285	Cessna 180	11 Nov 70	0	S	Nantucket, Mass. USA. Left wheel attach bolts.
G327	Cessna 180	10 Jun 72	0	S	Menomonee Falls, Wis. USA. Main gear (fretting).
G365	Cessna 180A	1974	0	S	Boulia, Qld, Australia. Right spring leg.

G389	Cessna 180H	1975	0	S	Jindabyne, NSW, Australia. Right gear leg.
G395	Cessna 180	1 Mar 75	0	S	Lake Elmo, Mn. USA. Fatigue fracture. Rust corrosion break in right main gear leg.
G403	Cessna 180	6 Aug 75	0	S	Wheatland, Wy. USA. Spring landing gear (outside retainer wedge). P/N 0741001-1.
G428	Cessna 180 Skywagon	17 May 76	0	S	Red Lake, Ont. Canada. Main gear leg.
G432	Cessna 180	20 Jun 76	0	S	Gelnhausen, W. Germany. Main landing gear strut attachment.
G441	Cessna 180G	1977	0	S	Boorowa, NSW, Australia. Left main gear spring leg.
G462	Cessna 180 Skywagon	10 Jun 78	0	S	Grand Centre, Alta. Canada. Right undercarriage leg near attachment holes.
G465	Cessna 180 Skywagon	23 Jun 78	0	S	Manning, Alta. Canada. Left gear at upper forward axle attaching bolt hole. 4427 airframe hours.
G480	Cessna 180J (skis)	11 Mar 79	0	S	Charlottetown, Lab., Canada. 2 bolts attaching right ski axle. Other 2 bolts had been missing for some time.
G484	Cessna 180 Skywagon	9 Jun 79	0	S	Arthur North, Ont. Canada. Right main gear leg at fuselage. Para-drop operations, 15,000 landings.
G497	Cessna 180 Skywagon (skis)	4 Mar 80	0	S	Cawdron Lake, Ont. Canada. Left main gear spring leg close to fuselage. Initiated by fretting and galling in soft decarburized surface zone.
G537	Cessna 180	27 Sep 81	0	S	Corcoran, Mn. USA. Spring arm P/N 0741001-2 at upper 2 axle attach bolt holes.
	Miscellaneous				
H12	Cessna 180	3 Sep 65	0	S	Tarentum, Pa. USA. Left brake.

CESSNA 182

	Engine				
E33	Cessna 182	6 Mar 64	0	D	Sedalia, Mo. USA. Master & connecting rods.
E37	Cessna 182A	25 Jul 64	2	D	Juneau, Alaska USA. Master & connecting rods

E68	Cessna 182B	29 Nov 65	0	S	Mokelumne Park, Cal. USA. Crankshaft gear, P/N 536421.
E70	Cessna 182	10 Dec 65	0	S	Hot Springs, Ark. USA. No. 6 cylinder exhaust valve.
E238	Cessna 182B	30 Jun 75	0	S	Wachenheim, West Germany. Crankshaft.
E300	Cessna 182M	1978	0	S	Wangaratta Vict., Australia. No. 5 piston disintegrated.
E317	Cessna 182Q	7 Sep 78	0	S	San Antonio, Tex. USA. Carb heat control cable improperly rigged, bent, failed.
E351	Cessna 182	16 Feb 80	0	S	Wandering River, Alta. Canada. Rocker arm support boss (overtorqued locking bolt).
	Propeller				
F142	Cessna 182	28 Nov 74	0	S	Lewiston, Id. USA. Propeller separated.
F171	Cessna 182	27 May 76	0	S	Vallejo, Cal. USA. Propeller blade (last thread in hub).
F177	Cessna 182M	24 Nov 76	0	S	Grain Valley, Mo. USA. Prop blade separated from hub (threaded area). Engine dampers out of tolerance.
F187	Cessna 182	18 Sep 77	0	S	Granite City, Ill. USA. Two 5th order dampers on crankshaft caused imbalance. Propeller separated.
F204	Cessna 182C	10 Sep 78	0	S	Hudson, N.Y. USA. Propeller blade actuating link P/N A1935 elongated, failed in fatigue.
	Landing Gear				
G46	Cessna 182	22 Feb 64	0	S	Napa, Cal. USA. Nose wheel fork.
G53	Cessna 182	4 Apr 64	0	S	Washington, D.C. USA. Nosewheel shimmy damper support bracket.
G59	Cessna 182	9 May 64	0	S	Northbrook, Ill. USA. Nose gear fork at radius of milled section at attach bolt.
G72	Cessna 182	30 Aug 64	0	S	Flagstaff, Ariz. USA. Nose wheel fork.
G82	Cessna 182	18 Oct 64	0	S	Cincinatti, Ohio. USA. Old crack in failed area of nose wheel fork.
G93	Cessna 182	7 Dec 64	0	S	Fayetteville, N.C. USA. Nose wheel fork.

G103	Cessna 182G	17 Feb 65	0	S	Syracuse, N.Y. USA. Nose gear torque link.
G109	Cessna 182	22 Apr 65	0	S	Butte, Mont. USA. Nose wheel fork.
G113	Cessna 182B	13 May 65	0	S	Northbrook, Ill. USA. Nose wheel fork.
G115	Cessna 182	22 Jun 65	0	S	Slocum, R.I. USA. Nose gear fork.
G120	Cessna 182E	15 Jul 65	0	S	Kansas City, Mo. USA. Nose gear fork.
G124	Cessna 182A	23 Aug 65	0	S	Dravosburg, Pa. USA. Nose gear fork.
G144	Cessna 182	23 Nov 65	0	S	Rolette, N.D. USA. Nose gear fork casting.
G151	Cessna 182	19 Dec 65	0	S	Pontiac, Mich. USA. Nose gear fork.
G177	Cessna 182C	2 Jul 66	0	S	Hyannis, Mass. USA. Nose wheel fork.
G186	Cessna 182A	3 Sep 66	0	S	Pottstown, Pa. USA. Nose gear shimmy dampener arm and nose wheel fork failed.
G191	Cessna 182A	28 Sep 66	0	S	Cairo, Ga. USA. Nose wheel shimmy dampener (at bracket).
G192	Cessna 182E	10 Oct 66	0	S	Nashville, Tenn. USA. Nose wheel fork at strut attachment.
G197	Cessna 182E	18 Jan 67	0	S	Vichy, Mo. USA. Nose wheel shimmy caused fork failure in areas weakened by previous damage.
G198	Cessna 182	31 Jan 67	0	S	Helena, Mont. USA. Nosewheel fork.
G208	Cessna 182	23 Apr 67	0	S	Millville, N.J. USA. Nose wheel fork.
G214	Cessna 182E	29 Jun 67	0	S	Teterboro, N.J. USA. Landing gear: nosewheel assemblies.
G225	Cessna 182A	29 Nov 67	0	S	El Paso, Tex. USA. Nose wheel fork.
G226	Cessna 182	12 Dec 67	0	S	Jefferson, Ga. USA. Nose wheel shimmy dampener attach bracket.

G239	Cessna 182A	29 Sep 68	0	S	Mill Creek, Okla. USA. Nose gear fork had cracks at strut attach bolt.
G326	Cessna 182F	31 May 72	0	S	Logansport, Ind. USA. Left gear strut. Origin: fretting corrosion.
G388	Cessna 182E	1975	0	S	Timboon, Vic., Australia. Fork of nose gear.
G454	Cessna 182E	1978	0	S	Beverley, WA, Australia. Right strut, corrosion fatigue.
	Miscellaneous				
H18	Cessna 182	30 Aug 70	0	S	Carey, Id. USA. Right brake line broken adjacent to step.
H31	Cessna 182M	1978	0	S	Bunbury WA, Australia. Broken brake cable.

CESSNA 185

	Engine				
E77	Cessna 185C	26 Feb 66	0	S	Morgan City, La. USA. Crankshaft at propeller mounting flange.
E259	Cessna 185 Skywagon	29 Apr 76	0	S	Whonnock Lake, B.C. Canada. Crankshaft. Engine: Continental O-470.
E270	Cessna 185E	28 Aug 76	0	S	Wainwright, Alas. USA. Throttle-power lever assemblies, support shaft for bellcranks failed.
E297	Cessna A185E	30 Oct 77	0	S	80 mi. SE Cornerbrook, Nfld. Canada. Air valve shaft in air intake box. Fastener hole drilled oversize and off-centre.
E306	Cessna 185 Skywagon	14 Jun 78	0	S	Chilliwack, B.C. Canada. Continental IO-520 engine. Induction airbox shaft, providing pivot on throttle bellcrank.
E360	Cessna 185	17 Jun 80	0	S	Iliamna, Ak. USA. Mixture-control valve shaft, P/N 0750173-1, on induction system airbox.
	Propeller				
F16	Cessna 185	13 Apr 64	0	S	Sullivan Bay, B.C. Canada. Propeller blade at thread roots.
F53	Cessna 185C	18 May 67	0	S	Houma, La. USA. Propeller blade (next to hub).
F106	Cessna 185	1972	0	S	Albany, WA, Australia. Propeller detached.
F116	Cessna 185E (floats)	5 Oct 72	0	S	Keswick, Ont. Canada. Propeller blade actuating pin (incorrect washer installed).

F149	Cessna 185	24 Jun 75	0	S	Churchill, Man. Canada. Propeller (severe dent on leading edge).
F219	Cessna 185 Skywagon	23 Mar 80	0	S	Dawson City, Y.T. Canada. 30" of blade shed (nick). 379 airframe hrs
	Landing Gear				
G269	Cessna 185A	1970	0	S	Moora, W.A., Australia. Port undercarriage main leg.
G289	Cessna 185	26 Nov 70	0	S	Glenallen, Alas. USA. Right gear strut spring.
G299	Cessna 185A	1971	0	S	Geraldton, WA, Australia. Cross tube of tailwheel.
G300	Cessna 185	1971	0	S	Geraldton, WA, Australia. Nosewheel on port float (faulty bolt).
G306	Cessna 185	12 Mar 71	0	S	Tasman Glacier, New Zealand. Port gear leg (axle attachment).
G402	Cessna 185A	3 Aug 75	0	S	Casper, Wy. USA. Left main wheel outer half (crack in rim).
G416	Cessna 185A	1976	0	S	Wilton, NSW, Australia. Right outboard landing gear support bracket.
G452	Cessna 185 Skywagon	6 Nov 77	0	S	Winnipeg Beach, Man. Canada. Left landing gear leg at wheel axle mount (2 axle bolt mounting holes).
G478	Cessna 185 Skywagon (skis)	6 Feb 79	0	S	Granville Lake, Man. Canada. Left gear attachment casting.
G496	Cessna 185 Skywagon (skis)	29 Feb 80	0	S	Poplar Point, Sask. Canada. Left outboard landing gear support bracket.
G499	Cessna 185 Skywagon	14 Mar 80	0	S	Baie Johan Beetz, Que. Canada. Right ski support bracket. 2262 airframe hours.
G500	Cessna 185 Skywagon	15 Mar 80	0	S	Pikangikum, Ont. Canada. Right main gear support bracket at rivet hole in upper beam at front slot corner. Excessive free play at leg root caused fretting. 3519 airframe hours.
G525	Cessna 185 Skywagon (skis)	28 Mar 81	0	S	Lac Pletipi, Que. Canada. Right main gear support bracket (fatigue corrosion).

CESSNA 188 AGWAGON/AGPICKUP/AGTRUCK/AGHUSKY

	Tail				
B27	Cessna A188B	25 Jul 74	0	S	Fairfax, S.C. USA. Right horizontal stabilizer rear spar and channel assembly.

	Engine				
E180	Cessna A188	7 Dec 72	0	S	Ashley Gorge, New Zealand. No. 4 connecting rod. 4363 hours.
	Propeller				
F118	Cessna A188-A	1973	0	S	Wee Waa, NSW, Australia. Propeller hub.
F145	Cessna A188A	15 May 75	0	S	Merced, Cal. USA. Propeller hub.
F215	Cessna A188A AGwagon	5 Nov 79	0	S	Stratford, New Zealand. Threaded shank of prop failed at 593 hours. UNS A92025 wrought Al alloy.
F226	Cessna A188B	1981	0	S	Naradhan, NSW, Australia. Propeller shaft.
F230	Cessna A188B	7 Aug 81	0	D	Bastrop, La. USA. McCauley D2A34C-98-0 prop hub. Inadequate inspection.
	Landing Gear				
G245	Cessna A188	1969	0	S	Byabarra, NSW, Australia. Port spring leg at attachment to fuselage fitting. Total time: 695 hours.
G264	Cessna A188	1970	0	S	Newrybar, NSW, Australia. Right gear leg fractured.
G296	Cessna 188A	1971	0	S	Tumut, NSW, Australia. Left gear collapsed.
G297	Cessna A188	1971	0	S	Goulbourn, NSW, Australia. Inboard attach bolt of right gear.
G341	Cessna A188-A	1973	0	S	Geraldton, WA, Australia. Left mainwheel bolt.
G362	Cessna A188	20 Nov 73	0	S	Awatoitoi Station, New Zealand. Port gear leg at fuselage. Origin: fretting.
G375	Cessna A188B	30 Apr 74	0	S	Arcadia, Fla. USA. Left main gear spring retention bolt (NAS 152RB16).
G461	Cessna 188	15 May 78	0	S	Cochran, Ga. USA. Main landing gear.
G481	Cessna A188B	5 May 79	0	S	Newman, Cal. USA. Right main strut (approx 8" above wheel).
G492	Cessna A188	1980	0	S	Dorrigo, NSW, Australia. Tailwheel assembly.
	Brake Line				
H23	Cessna A188B	1977	0	S	Quairading, WA, Australia. Crack in port brake line.

CESSNA 190

	Landing Gear				
G271	Cessna 190	25 Feb 70	0	S	Lewiston, Id. USA. Main gear assembly.

CESSNA 195

	Wing				
A57	Cessna 195	1960	?	D	USA. Wing failure. Wing carry-through.
A66	Cessna 195	1963	?	D	USA. Wing failure. Wing carry-through.
	Engine				
E28	Cessna 195	14 Jun 62	0	D	Kaouk River, B.C. Canada. Crankshaft.
E118	Cessna 195	22 May 69	1	D	Flat Lake, Ont. Canada. No. 4 & 5 conrods failed due to no. 4 knuckle pin failure.
	Landing Gear				
G108	Cessna 195A	13 Apr 65	0	S	Madison, Wis. USA. Cross-wind wheel spindle pivot pin bolt (left gear).
G222	Cessna 195	3 Nov 67	0	S	Arcata, Cal. USA. Main gear. Origin: 1/4 inch drilled hole, right strut.
G252	Cessna 195	25 Apr 69	0	S	Keene, N.H. USA. Right landing gear.
G262	Cessna 195	13 Nov 69	0	S	Nashville, Tenn. USA. Left gear (wedges on outboard side of fuselage gear saddle).
G336	Cessna 195	23 Oct 72	0	S	Santa Ana, Cal. USA. Gear collapsed.
G412	Cessna 195	4 Nov 75	0	S	Elko, Nev. USA. Left spring steel gear leg.
G524	Cessna 195	22 Mar 81	0	S	Redwood Falls, Mn. USA. Right gear spring, P/N 034-109-2.
	Miscellaneous				
H16	Cessna 195A	5 Dec 68	0	S	Paso Robles, Cal. USA. Left brake actuating rod.

CESSNA 206 SKYWAGON

	Tail				
B17	Cessna U206B	19 Sep 71	1	D	Anchorage, Alaska, USA. Vertical fin & rudder separated, cracks at attach points.
	Engine/Transmission				
E111	Cessna P206	1969	0	S	Port Headland, WA., Australia. No. 5 cylinder head at threads.

E189	Cessna U206	7 Mar 73	0	D	Kihei, Hawaii, USA. Crankshaft at no. 2 journal.
E226	Cessna U206	15 Mar 75	0	S	Kenai, Alas. USA. Crankshaft.
E235	Cessna 206B	23 Jun 75	0	S	Imperial, Cal. USA. No. 3 cylinder conrod bolts.
E276	Cessna U206F	26 Feb 77	1	S	Clarks Junction, New Zealand. Cracked tooth in camshaft cluster gear. Engine time: 671 hours.
E324	Cessna U206	1979	0	S	Mt. Isa Qld., Australia. No. 6 cylinder separated (crack in flange). Loose hold-down nut.
E374	Cessna P206	1981	0	D	Kilcoy, Queensland Australia. #4 cylinder exhaust valve.
E378	Cessna U206F	12 Jan 81	0	S	Sherburne, Mn. USA. Crankshaft no. 2 main journal.
	Propeller				
F67	Cessna 206	8 Feb 68	0	D	E. Prairie, Miss. USA. Crankshaft imbalance caused prop failure.
F68	Cessna P206A	12 Feb 68	0	S	Fort Madison, Iowa. USA. Propeller hub.
F111	Cessna P206	16 May 72	0	S	Fremont, Cal. USA. Blade separated, crankshaft sheared at mounting flange.
F112	Cessna P206	18 May 72	0	S	Huntington Beach, Cal. USA. Propeller blade.
F125	Cessna 206	9 Sep 73	0	S	East Boston, Mass. USA. Propeller hub.
F127	Cessna 206F	3 Nov 73	0	S	Nagoya, Japan. Screw parts of #2 prop blade.
F227	Cessna 206	3 Mar 81	0	S	Lae, Papua New Guinea. Propeller blade.
F229	Cessna P206A	28 Jul 81	0	S	Marathon, Fl. USA. McCauley hub model E2A34C74 separated. Dynamic dampener P/N 352117 beyond limits.
	Landing Gear				
G331	Cessna TU206B	22 Jul 72	0	D	Lone Pine, Calif. USA. Nose gear steering collar.
G476	Cessna U206	4 Jan 79	0	S	Atmautluak, Ak. USA. Main landing gear.

G509	Cessna U206	28 Jul 80	0	S	Kenai, Ak. USA. Nosewheel upper torque link assembly, P/N 0442506-1.

CESSNA 207 SKYWAGON

	Engine				
E249	Cessna 207	1976	0	S	Groote Eylandt, NT., Australia. Muffler baffles separated from rods.
E342	Cessna 207	8 Sep 79	0	S	Umiat, Ak. USA. Crankshaft at no. 2 journal.
	Propeller				
F156	Cessna 207	10 Aug 75	0	S	Topeka, Kans. USA. Propeller hub. Counter wt and bushing wear excessive.

CESSNA 210 CENTURION

	Fuselage				
C14	Cessna 210	5 Jul 64	0	S	Richmond, Va. USA. Fuselage bulkhead assembly P/N 1243022-1 failed. Gear collapsed.
	Engine				
E57	Cessna 210E	19 Jul 65	0	S	McCracken, Kans. USA. No. 3 cylinder connecting rod.
E144	Cessna 210K Centurion	24 Mar 71	1	D	Roganville, Texas, USA. Fillets of no. 2 main journal.
E169	Cessna 210B	25 May 72	0	S	Wappapello, Mo. USA. # 1 cylinder cracked (inspection overdue).
E240	Cessna 210	4 Aug 75	1	S	Hope, BC, Canada. Connecting rod.
E254	Cessna 210	11 Jan 76	0	S	Carpenteria, Cal. USA. Crankshaft.
E262	Cessna 210C Centurion	7 May 76	1	D	Florence, Oregon, USA. Crankshaft failure. Main bearing mis-aligned, wrong con rod bearings.
E268	Cessna 210	16 Aug 76	0	S	Ellgau, W. Germany. Connecting rod bearing due to bushing wear.
E273	Cessna 210B Centurion	21 Oct 76	1	S	Granbury, Texas USA. Hold-down studs of No. 5 cylinder (under-torquing)
E282	Cessna 210K	11 Jun 77	0	S	Manor, Tex. USA. Crankshaft.
E283	Cessna 210 Centurion	23 Jun 77	1	D	Summerland Key, Florida USA. Propeller cylinder separated, oil on windshield restricted vision.

E299	Cessna T210L	23 Dec 77	0	S	Moriarty, N.M. USA. Crankshaft. Previous prop strikes.
E303	Cessna 210-5	20 May 78	0	D	Phoenix, Ariz. USA. Crankshaft.
E333	Cessna 210 Centurion	17 Apr 79	6	D	Cable, Wi. USA. No. 3 exhaust valve.
E347	Cessna 210	19 Nov 79	0	S	Beckwourth, Cal. USA. Crankshaft at no. 5 and 6 cylinder journals.
E361	Cessna P210	10 Jul 80	1	D	Marcellus, Mi. USA. Cylinder separated after fatigue of under-torqued thru-bolts & hold-down studs.
E381	Cessna 210N	22 Feb 81	0	S	Miyagi Pref., Japan. Piston pin.
	Propeller				
F15	Cessna 210	1 Feb 64	0	S	Bolivar, Mo. USA. Propeller blade.
F74	Cessna 210C	11 Sep 68	0	S	Patricia, Tex. USA. Propeller blade failed approx. 5" from tip.
F130	Cessna 210-5A	1974	0	S	Morwell, Vict. Australia. Propeller blade shed.
F136	Cessna 210K	18 Aug 74	0	D	Joy, Ky. USA. Propeller blade.
F195	Cessna 210K	28 Apr 78	0	S	Corona, N.M. USA. Propeller blade separated. Blades had previous damage straightened.
	Landing Gear				
G64	Cessna 210	16 Jun 64	0	S	Klamath Falls, Ore. USA. Nose gear hydraulic line assembly, P/N 1280106-3.
G69	Cessna 210	2 Aug 64	0	S	St. Louis, Mo. USA. Piston rod of nose gear actuating hydraulic cylinder (threads).
G160	Cessna 210	22 Feb 66	0	S	Lafayette, La. USA. Left main gear actuator spindle shaft.
G195	Cessna 210	17 Dec 66	0	S	Newburyport, Mass. USA. Left main landing gear actuator assembly spindle. P/N ED11935L.
G229	Cessna 210	25 Feb 68	0	S	Howell, Mich. USA. Nose wheel fork.
G244	Cessna 210B	1969	0	S	Cudal, NSW, Australia. Port leg (saddle failed).

G298	Cessna 210B	1971	0	S	Cudal, NSW, Australia. Actuator spindle (right gear).
G319	Cessna 210-5	1972	0	S	Surfers Gardens, Qld. Australia. Attachment bolt, right spring leg (wrong nut).
G340	Cessna 210A	1973	0	S	Groote Eylandt, NT, Australia. Shaft of spindle flange in port gear actuator.
G415	Cessna 210B	1976	0	S	Alice Springs, NT, Australia. Hydraulic actuator cracked.
G417	Cessna 210G	1976	0	S	Moorabin, Vict., Australia. Port main gear saddle assembly.
G425	Cessna 210H	16 Mar 76	0	S	Dothan, Ala. USA. Saddle fitting clamp of main gear.
G455	Cessna 210B	1978	0	S	Moorabbin, Vict., Australia. Right actuator spindle. Part not replaced.
G456	Cessna 210A	1978	0	S	Rockhampton, Qld. Australia. Hydraulic line between nose gear door actuator & up-lock actuator.
G457	Cessna 210H	1978	0	S	Toowomba, Qld., Australia. Left main gear saddle fractured (misrigging).
G458	Cessna 210L	21 Jan 78	0	S	Flagstaff, Ariz. USA. Left main gear downlock hook assembly, P/N 1241111-200.
	Hydraulic Line				
H17	Cessna 210	1970	0	S	Archerfield, Qld. Australia. Hydraulic line. No fluid to lower gear.

CESSNA 305 BIRD DOG

	Landing Gear				
G435	Cessna 305	25 Aug 76	0	S	Manhattan, Kans. USA. Main gear (broken bolt).

CESSNA 310

	Engine				
E84	Cessna 310	10 Jul 66	2	D	Longmont, Colo. USA. Fracture at poor weld in exhaust, caused fuel fire & separation of right wing.
E112	Cessna 310F	19 Feb 69	4	D	Reno, Nev. USA. Master & connecting rods.
E201	Cessna 310C	21 Nov 73	0	D	Montrose, Colo. USA. No. 1 cylinder barrel of engine separated.
	Propeller				
F58	Cessna 310D	11 Sep 67	0	S	Clovis, N.Mex. USA. 1 foot of left propeller failed.

F76	Cessna 310B	27 Oct 68	0	S	Zanesville, Ohio. USA. Blade of left propeller at hub spider.
F114	Cessna 310J	22 Aug 72	0	S	Wichita Falls, Tex. USA. Propeller blade.
F124	Cessna 310I	18 Aug 73	0	S	Miami, Fla. USA. Propeller (hub bolt holes).
F163	Cessna 310J	29 Jan 76	0	S	Lubbock, Tex. USA. Blade separated from hub, right engine.
F174	Cessna 310L	21 Aug 76	0	S	Carpenter, S.D. USA. Engine counterweight dampers out of tolerance. Engine mount structure bent. Fatigued prop hub.

Landing Gear

G98	Cessna 310	18 Jan 65	0	S	Rochester, N.Y. USA. Nose gear lock torque tube.
G133	Cessna 310C	6 Oct 65	0	S	Pasco, Wash. USA. Right main gear oleo strut.
G152	Cessna 310C	22 Dec 65	0	S	Memphis, Tenn. USA. Nose gear main drive tube assembly. P/N 0842120-1
G171	Cessna 310	29 Apr 66	0	S	Concord, Cal. USA. Nose gear bell crank.
G184	Cessna 310F	13 Aug 66	0	S	Chantilly, Va. USA. Nose gear actuating rod.
G190	Cessna 310H	27 Sep 66	0	S	Purchase, N.Y. USA. Uplock torque tube (nose gear).
G237	Cessna 310	30 Aug 68	0	S	Pittstown, N.J. USA. Torque tube assembly at LH bearing assembly.
G243	Cessna 310B-A1	1969	0	S	Bankstown, NSW, Australia. Right main gear actuator tube (inboard rivet line). Previous buckling. Total time: 4830 hrs.
G491	Cessna 310	5 Dec 79	0	S	Mackay, Qld. Australia. Right gear uplock actuating rod.
G498	Cessna 310I	7 Mar 80	0	S	Mammoth Lakes, Ca. USA. Right main landing gear support forging, P/N 0822180-6.

CESSNA 320 SKYNIGHT

Flight Controls

D28	Cessna 320B	6 Jun 75	0	S	Bowling Green, Ky. USA. Elevator push-pull rod attach rivets.

Landing Gear

G150	Cessna 320	18 Dec 65	0	S	Teterboro, N.J. USA. Nose wheel drive tube

G382	Cessna 320B	17 Aug 74	0	S	Sacramento, Cal. USA. Left uplock torque tube assembly support stud. Service letter not complied with.
	Fuel Line				
H28	Cessna 320 Skyknight	8 Aug 77	0	S	Tsuniah Lake, B.C. Canada. Fuel vent line nipple in lower forward quadrant as viewed from outside. Similar failure on main fuel outlet. Airframe time 2100 hours.

CESSNA 336 SKYMASTER

	Propeller				
F70	Cessna 336	4 Jul 68	0	S	Finlay Forks, B.C. Canada. Rear propeller blade.
F168	Cessna 336 Skymaster	11 Mar 76	4	D	McGregor, Iowa USA. Propeller separated.
F193	Cessna 336	24 Apr 78	0	S	Gisborne, New Zealand. Prop hub and retaining nut failed from fatigue.

CESSNA 337

	Flight Controls				
D34	Cessna 337 Super Skymaster	30 Sep 77	0	S	Kingston, Ont. Canada. Upper rod, between bellcrank and elevator balance weight arm (threads). 3658 airframe hrs
	Engine				
E223	Cessna 377	6 Dec 74	0	S	Cabonga Reservoir, Que. Canada. Crankcase.
E227	Cessna T337	18 Mar 75	0	S	Dubois, Id. USA. Line to fuel flow gauge.
	Propeller				
F170	Cessna 337	4 May 76	0	S	Barrow, Alas. USA. Rear prop dowel pin on pitch change mechanism.

CESSNA 402

	Engine				
E233	Cessna 402A	15 Jun 75	0	S	Seattle, Wash. USA. Exhaust manifold, right engine.
E295	Cessna 402B	29 Sep 77	2	D	Mercer, Penn. USA. Crack in manifold couple permitted exhaust gas into wing, causing fire.
E318	Cessna 402B	7 Sep 78	0	D	Hyder, Arizona USA. Fracture of exhaust system from excessive vibration. Bolt connecting ball joint on right side of left engine missing.
	Landing Gear				
G275	Cessna 402	22 Apr 70	0	S	Pembina, N.Dak. USA. Left main landing gear torque arm attach lug.
G410	Cessna 402A	13 Oct 75	0	D	Miyako Airport, Japan. Side link support rib, left landing gear.

G438	Cessna 402B	7 Oct 76	0	S	Hachinoe, Japan. Torque arm support bracket, nose gear.
G471	Cessna 402	27 Sep 78	0	S	Indianapolis, Ind. USA. Landing gear cylinder and trunnion. P/N 504-1000-81.
G483	Cessna 402B	9 Jun 79	0	S	Kikaiga Island, Japan. Welding fitting part, left main gear torque tube.
G488	Cessna 402	8 Sep 79	0	S	Adelaide, SA, Australia. Starboard gear torque tube bellcrank (mis-rigging).
G508	Cessna 402B	3 Jul 80	0	S	Van Nuys, Ca. USA. Right main landing gear side brace lock link, P/N 5041001-2.

CESSNA 411

	Engine				
E168	Cessna 411	30 Apr 72	0	S	Monticello, Miss. USA. # 1 & 2 cylinder exhaust valves (right engine).
	Landing Gear				
G378	Cessna 411	1 Jun 74	0	S	Reno, Nev. USA. Bolt in right main gear retraction assembly.

CESSNA 421 GOLDEN EAGLE

	Engine				
E250	Cessna 421B	1976	0	S	Norseman, WA, Australia. Broken weld joint on right-hand exhaust slip joint assembly.
	Landing Gear				
G397	Cessna 421	16 May 75	0	S	Kuusamo Airfield, Finland. Bellcrank in nose gear retraction linkage.

CHAMPION CITABRIA

	Landing Gear				
G279	Champion 7ECA	6 Aug 70	0	S	West Chester, Pa. USA. Left main gear attach bolt.
G287	Champion 7ECA	18 Nov 70	0	S	Dayton, Ohio. USA. Right axle at strut attach mounting pad.
G290	Champion 7ECA	28 Nov 70	0	S	Santa Ana, Cal. USA. Left main gear attach bolt. P/N AN7-26.
G307	Champion 7GCBC	23 May 71	0	S	Elsinore, Cal. USA. Left main landing gear attach bolt.
G321	Champion 7GCAA	3 Mar 72	0	S	Edgefield, S.C. USA. Left gear (attach bolt).
G338	Champion 7GCAA Citabria	1973	0	S	Mooroodue Vic., Australia. Attach bolts, port gear.

G398	Aeronca 7GCBC Citabria	14 Jun 75	0	S	Frechen, W. Germany. Left main gear leg strut attachment below cowling.
G436	Champion 7ECA	4 Sep 76	0	S	Charleston, S.C. USA. Right main gear attach bolts.
G437	Champion 7GCBC Citabria	18 Sep 76	0	S	Winzeln, W. Germany. Shock strut of left main gear.
G446	Aeronca 7GCBC Citabria	16 Jul 77	0	S	Albstadt-Degerf., W. Germany. Right main gear leg strut attachment below cowling.
G468	Bellanca 7ECA Citabria	20 Aug 78	0	S	Rockton, Ont. Canada. Left undercarriage leg. 1268 airframe hours.
G469	Bellanca 7GCBC Citabria	15 Sep 78	0	S	Thorton, Co. USA. Left main wheel axle.
G502	Champion 7ECA Citabria	6 Apr 80	0	S	Joliette Airport, Que. Canada. Main gear leg through-bolt (bolt undertorqued). 2260 airframe hours.
G522	Bellanca 7ECA Citabria	4 Mar 81	0	S	Snow Lake, Man. Canada. Ski axle along weld between it and mounting flange.
G540	Champion 7ECA Citabria	20 Jan 82	0	S	St. Jean, Que. Canada. Ski right gear leg at fuselage attachment (corrosion pits).

CHAMPION TRI-TRAVELER

Propeller

F186	Champion 7FC	20 Aug 77	0	S	Moline, Ill. USA. Propeller blade.

Landing Gear

G104	Champion 7FC Tri-Traveler	21 Feb 65	0	S	Milton, Fla. USA. Nose gear fork.

COMMONWEALTH CA-28 CERES

Engine

E202	C.A.C. Austrl. CA-28C Ceres	1974	0	S	Glen Innes, NSW, Australia. Cylinder assembly.
E375	Commonwealth CA-28 Ceres	1981	0	S	Glenreagh NSW, Australia. No. 3 cylinder exhaust rocker arm cover.

Brake Line

H20	C.A.C. Austrl. CA-28C Ceres	1973	0	S	Leeton NSW, Australia. Port brake line at work hardened area.

COMMONWEALTH 185

Landing Gear

G316	Commonwealth 185	20 Sep 71	0	S	Mesa, Ariz. USA. Right landing gear tube.

CONSOLIDATED PBY CATALINA

	Landing Gear				
G286	Consolidated 28-5AC PBY Catalina	14 Nov 70	0	S	Christiansted, Vi. USA. Left main gear hydraulic actuator.

CONVAIR B-36

	Wing				
A35	Convair B-36 (USAF)	1952 or 1953	?	?	? Wing failure.
	Tail				
B7	Convair B-36 (USAF)	1953-59	?	?	? Tail failure.
	Landing Gear				
G5	Convair B-36 (USAF)	1953-59	?	?	? Starboard landing gear (threads).

CONVAIR 240/340/440/580/600

	Engine				
E11	Convair 240	4 Aug 55	11	D	Fort Leonard Wood, Missouri, USA. Crack in cylinder wall of engine, causing fire & separation of wing. Unairworthy cylinder installed.
E164	Convair 600	16 Feb 72	0	S	Beaumont, Tex. USA. Low pressure impeller (right engine).
	Propeller				
F35	Convair 240	12 May 66	0	S	Fort Worth, Tex. USA. Right engine no. 3 propeller blade.
F46	Convair 340	5 Mar 67	38	D	Marseilles, Ohio. USA. 4 propeller blades separated. Helical splines of torque piston failed because of omission of nitriding process. Torque cylinder of blade pitch change unit failed from fatigue.
	Landing Gear				
G42	Convair 440	1 Nov 63	0	S	Atlanta, Ga. USA. Wheel axle of left main gear. Origin: fillet at flange.
G257	Convair 600	1 Aug 69	0	S	Houston, Tex. USA. Nose gear retract cylinder rod.
G293	Convair 580	23 Dec 70	0	S	Kansas City, Mo. USA. Left main landing gear inboard strut outer cylinder.
G324	Convair 600	8 May 72	0	S	Alexandria, La. USA. Nose gear piston rod.
G352	Convair 580	12 Jun 73	0	S	Pittsburgh, Pa. USA. Nose gear upper left drag strut.

G477	Convair 580	19 Jan 79	0	S	St. Louis, Mo. USA. Nose gear drag strut, PLN 340-5210105.

CONVAIR 990

	Landing Gear				
G256	Convair 990 (American)	29 Jul 69	0	S	Fort Worth, Tex. USA. Landing gear support beam.

COONEY R-1 TOMCAT

	Engine				
E108	Cooney R-1 Tomcat	24 Sep 68	0	S	Lamoni, Iowa. USA. Crankshaft.

CROPMASTER YA1-25

	Landing Gear				
G267	Cropmaster YA1-25	1970	0	S	Cudgewa Vic., Australia. Main gear strut plunger.

CULVER V

	Landing Gear				
G75	Culver V	9 Sep 64	0	S	Pacoima, Cal. USA. Right gear retract push-pull tube.

CURTISS AT-32 CONDOR II

	Wing				
A2	Curtiss AT-32 Condor II	27 Jul 34	11	D	Tuttelingen, Germany. Port inter-wing strut failed, causing separation of engine & part of lower wing.

CURTISS C-46 COMMANDO

	Wing				
A59	Curtiss C-46F	15 Oct 60	2	D	Plain City, Utah USA. Right wing separated. Lower attach angle bolts holding forward portion of outer wing to centre section.
	Tail				
B24	Curtiss C-46A	17 Dec 73	3	D	Coyhaique, Chile. Elevator separated (elevator hinge pins?).
	Engine				
E6	Curtiss C-46F	16 Dec 51	56	D	Newark, N.J. USA. Hold-down studs of # 10 cylinder, right engine.
E13	Curtiss C-46F	6 Nov 57	2	D	Guatemala City, Guatemala. Crankshaft of port engine.
E18	Curtiss C-46	29 Jan 60	0	D	Port Hardy, B.C. Canada. Reduction drive ring gear in right engine.
E19	Curtiss C-46A	5 Apr 60	2	D	Siuna Aerodrome, Nicaragua. Port engine failed due to fatigue of distributor valve of port propeller.
E23	Curtiss C-46F	22 Jan 61	2	D	Katy, Texas, USA. No. 8 cylinder hold-down studs. Uncontrollable fire & separation of wing.

E24	Curtiss C-46F	28 Aug 61	0	S	Fairbanks, Alaska. USA. Holddown studs, no. 8 cylinder, left engine.
E59	Curtiss C-46A	12 Aug 65	13	D	Barra do Bugres, Brazil. Bolts of no. 8 cylinder, left engine. Engine fire caused wing separation
E296	Curtiss C-46	29 Sep 77	0	S	Thompson, Man. Canada. Pratt & Whitney R-2800 engine. Low oil pressure due to small piece of failed piston skirt which became wedged under oil pressure relief valve.
	Landing Gear				
G16	Curtiss C-46F	9 Sep 59	0	S	Dallas, Tex. USA. Front spar attachment fittings of right gear (bolt hole).
G29	Curtiss C-46F	10 Mar 61	0	S	St. Louis, Mo. USA. Left main gear, drag link assembly.
G38	Curtiss C-46	5 Jun 62	0	S	San Juan, Puerto Rico. Side brace, left main gear (improper machining)
G41	Curtiss C-46	5 Sep 63	0	S	Anchorage, Alaska USA. Hydraulic pressure line, external ground service fitting, right gear.
G43	Curtiss C-46A	1 Jan 64	0	S	Hill AFB, Ut. USA. Main landing gear.
G102	Curtiss C-46	8 Feb 65	0	S	Atlanta, Ga. USA. Left landing gear. TSO 12457 hours.
G125	Curtiss C-46F	31 Aug 65	0	S	Atlanta, Ga. USA. Gear collapsed. Improperly fabricated hose, wrong bolt.

CURTISS SB2C HELLDIVER

	Tail				
B4	Curtiss SB2C Helldiver (USAF)	WWII	?	D	? Lost horizontal tail. Cracks found in tails of other SB2C and Brewster SB2A aircraft. Attributed to structural response to unsteady airloads

DASSAULT MIRAGE III

	Engine				
E170	Dassault Mirage III (RAAF)	17 Jul 72	0	D	Butterworth, Malaysia. 7th stage compressor rotor ring. Manufacturing defect. Elongation of rivet holes.
E209	Dassault Mirage III (RAAF)	1 Apr 74	0	D	Butterworth, Malaysia. Compressor first stage blade (manufacturing defect).

DE HAVILLAND D.H. 82 TIGER MOTH/QUEEN BEE

Engine

E252	de Havilland 82	1976	0	S	Taree NSW, Australia. Rocker bracket bolts, no 4 cylinder.

Landing Gear

G490	de Havilland DH-82A Tiger Moth	14 Oct 79	0	S	Cypress, Tex. USA. Eye on right axle assembly failed (where compression strut was attached).

DE HAVILLAND D.H. 104 DOVE

Wing

A33	D.H. 104 Dove	15 Oct 51	7	D	Kalgoorlie, Western Australia. Left wing failure. Crack in channel section, centre section spar. Matl: DTD 363 (equiv 75ST). 8977 airframe hours.
A92	D.H. 104 Dove	28 Jan 70	9	D	Cleveland, Ohio, USA. Wing separation. Lower right wing/fuselage root joint attach fitting. Material: steel. Airframe hours: 9384.
A98	DH 104-7 AXC Dove	6 May 71	12	D	Coolidge, Ariz. USA. Right wing failure. Lower main root joint fitting. Fatigue propagated in area of corrosion & fretting.

Landing Gear

G52	de Havilland 104-5 Dove	25 Mar 64	0	S	Hilo, Hawaii. USA. Main gear collapsed.
G322	de Havilland DH-104 Dove	14 Mar 72	0	S	San Juan, Puerto Rico. Left main gear actuating piston. P/N AHO 19742.

DE HAVILLAND D.H. 114 HERON

Propeller

F41	de Havilland 114 Heron	3 Aug 66	0	S	San Juan, Puerto Rico. No. 4 propeller separated (prop barrel).
F153	de Havilland D.H.114 Heron	11 Jul 75	0	S	San Juan, Puerto Rico. Propeller blade.

Landing Gear

G200	D.H. 114 Heron 1B	25 Feb 67	0	S	Montego Bay, Jamaica. Left axle plug, nose gear.

DE HAVILLAND COMET 1

Fuselage

C6	D.H. Comet 1	10 Jan 54	35	D	Mediterranean Sea off Elba, Italy. Fuselage fatigue failure. Origin: ADF window
C7	D.H. Comet 1	8 Apr 54	21	D	Mediterranean Sea off Naples, Italy. Fuselage fatigue failure. Origin: ADF window

DE HAVILLAND COMET 4

	Engine				
E29	de Havilland Comet 4	11 Oct 62	0	S	London, UK. 'O' stage compressor blade, no. 3 engine.
E178	de Havilland Comet 4C	3 Nov 72	0	S	Benina, Libya. No. 2 engine, H.P. turbine disk (P/N BR 54658A) at rim.
	Landing Gear				
G51	de Havilland Comet 4	22 Mar 64	0	D	Singapore. Right landing gear main forging at gear leg.
G333	de Havilland Comet 4	20 Aug 72	0	S	Salzburg, Austria. Nose wheel jack piston head.

DE HAVILLAND DHC-1 CHIPMUNK

	Engine				
E34	de Havilland DHC-1 Chipmunk	26 Apr 64	0	S	Orillia, Ont. Canada. Crankshaft at tapered propeller end. Caused prop separation.
	Propeller				
F12	de Havilland DHC-1 Chipmunk	18 Jun 62	0	S	Winnipeg, Man. Canada. Prop blade shed just outboard of attaching bolts (fretting from inadequate torquing).

DE HAVILLAND DHC-2 BEAVER

	Wing				
A69	de Havilland DHC-2 Beaver	10 Sep 63	1	D	Armidale, Australia. Wing failure (strut attachment fitting).
A76	de Havilland DHC-2 Beaver	Jul 64	1	D	Australia. Wing failure (strut attachment fitting).
A136	de Havilland DHC-2 Beaver	1 Aug 81	1	S	Big Hook Lake, Ont. Canada. Left wing separated (upper fitting of strut assembly). Strut had improperly-formed fillet radius and was not removed from service as per AD. 7228 airframe hours.
	Tail				
B36	D.H. DHC-2 Mk.1 Beaver	6 Dec 79	1	D	Captain's Flat, NSW, Australia. Vertical stabilizer separated. Mounting bracket P/N C2TF13. Attach fitting damaged in prior accident. Role: agricultural.
	Engine				
E264	de Havilland DHC-2 Mk I Beaver	2 Jul 76	0	S	The Martin Hills, NWT. Canada. Unapproved hard brass fitting on fuel line inlet to carburetor.
E338	de Havilland DHC-2 Beaver	25 Jul 79	0	D	Yarrowitch NSW, Australia. Cracked cylinder head.
E363	de Havilland DHC-2 Mk I Beaver	7 Aug 80	0	S	Bartlett's Pond, Nfld. Canada. No. 2 cylinder head separated from barrel. Pratt & Whitney R-985 engine.

E368	de Havilland DHC-2 Mk.1 Beaver	10 Sep 80	3	D	Whitehorse, Yukon Canada. No. 3 piston pin. Initiated by corrosion pitting on pin surface.

DE HAVILLAND DHC-3 OTTER

Engine

E22	de Havilland DHC-3 Otter	16 Sep 60	0	S	Frobisher Bay, NWT. Canada. Crankshaft at mating splines between front and rear halves.
E82	de Havilland DHC-3 Otter	16 Jun 66	0	S	Pocketknife Creek, B.C. Canada. Bushing in no. 2 cylinder exhaust rocker box casting.
E236	de Havilland DHC-3 Otter	25 Jun 75	0	S	Unnamed lake, Que., Canada. Crack in valve rocker arm housing resulted in valve failure.

Landing Gear

G217	de Havilland DHC-3 Otter	6 Aug 67	0	S	Cape Sparbo, NWT. Canada. Main gear attachment bolt.
G445	de Havilland DHC-3 Otter	14 Apr 77	0	S	GB-1, Que. Canada. Bolt holding right gear strut to the fuselage (lubrication hole). Service bulletin not complied with.

DE HAVILLAND DHC-6 TWIN OTTER

Propeller System

F209	de Havilland DHC-6 Twin Otter	27 Feb 79	0	S	Cheyenne, Wy. USA. Propeller system: control unit, PCV - fatigue fracture.

Landing Gear

G495	de Havilland DHC-6 Twin Otter	7 Feb 80	0	S	College Station, Tx. USA. Right lower landing gear leg separated at Y-joint.

DORNIER MERKUR

Wing

A1	Dornier Merkur	23 Sep 27	6	D	Schleiz, Thuringen, Germany. Wing failure. Wing strut close to upper attachment point.

DORNIER 27

Engine

E309	Dornier DO 27B-1	27 Jun 78	0	D	Varberg, W. Germany. Exhaust valve of cylinder #2.

DOUGLAS A-26/B-26 INVADER

Wing

A70	Douglas B-26 Invader (USAF)	7 Jan 64	2	D	Vietnam. Wing failure, main spar. Role: counter-insurgency.

A71	Douglas B-26 Invader (USAF)	9-15 Feb 64	2	D	Vietnam. Wing failure, main spar. Role: counter-insurgency.
A74	Douglas B-26 Invader (USAF)	Apr 64	2	D	Elgin Air Force Base, Fla. USA. Left wing separated. Failure of lower spar cap. Role: Ground attack (strafing)
A134	Douglas B-26 (Calspan variable-stability aircraft)	3 Mar 80	3	D	Near Edwards AFB, Cal. USA. Left wing failure. Front lower forward spar cap at WS 140 (most outboard bolt hole attaching spar to nacelle fittings). 9467 airframe hours.
	Landing Gear				
G230	Douglas A-26 Invader	16 Mar 68	0	S	Kansas City, Kans. USA. Right gear trunnion pivot fittings.

DOUGLAS DC-3/C-47/DAKOTA

	Wing				
A85	Douglas DC-3	8 Apr 68	36	D	Coyhaique, Chile. Starboard wing failure.
A104	Douglas DC-3	10 Sep 72	11	D	Dabark, Ethiopia. Right wing separated. Wing-to-centre section attachment.
A106	Douglas DC-3	23 Feb 73	1	D	Seddon, New Zealand. Separation of right wing. Lower centre wing wrap-around & internal doublers, inboard of WS 142. Role: fertilizing. Airframe hours: 24,261 including 1503 in agricultural role.
	Engine				
E2	Douglas DC-3	16 May 46	27	D	Richmond, Va. USA. Crack in no. 6 cylinder of left engine.
E3	Douglas DC-3	21 Aug 46	2	D	Moline, Ill. USA. No. 5 cylinder at barrel between fins & flange.
E5	Douglas Dakota	30 Jul 48	0	D	Sywell, UK. Malfunction of starboard engine, constant speed unit due to fatigue failure of filter gauze.
E7	Douglas DC-3	4 Feb 52	16	D	Kitwit, Belgian Congo. No. 6 piston lug failed, shearing off prop
E21	Douglas DC-3	6 Sep 60	0	S	Des Moines, Iowa, USA. No. 10 cylinder exhaust insert mounting of right engine.
E27	Douglas Dakota	24 May 62	4	D	Rajshani, E. Pakistan. Port engine.
E38	Douglas DC-3	19 Aug 64	0	D	Tonopah, Nevada, USA. Fractures of right engine no. 12 cylinder, and left engine front master rod bearing.

E154	Douglas DC-3C	11 Oct 71	0	S	New Braunfels, Tex. USA. Fuel pressure ind/oil dilution restrictor fitting on right carb.
E239	Douglas Dakota (RAAF)	9 Jul 75	0	S	Sale, Vic., Australia. R.h. engine, fracture of rear master connecting rod cap.
	Propeller				
F2	Douglas DC-3	11 Jan 46	0	S	Indianapolis, Ind. USA. Right propeller.
	Landing Gear				
G10	Douglas DC-3	22 Jan 59	0	S	Huntington, WV USA. Centre wing to drag strut attach fitting, at lower attach bolt holes.
G18	Douglas DC-3	23 Dec 59	0	S	Tyler, Tex. USA. Brace strut of right gear.
G24	Douglas DC-3	13 Aug 60	0	S	Madison, Wis. USA. Strut brace fitting of left gear.
G35	Douglas DC-3	5 Mar 62	0	S	Sugluk, Que. Canada. Upper truss of right main undercarriage near front gusset.
G44	Douglas C-47	11 Jan 64	0	S	Porto Alegre, Brazil. Starboard landing gear.
G74	Douglas C-47	8 Sep 64	0	S	Idiris Airport, Libya. Left-hand brace strut attach fitting.
G231	Douglas DC-3C	3 May 68	0	S	Jacksonville, Fla. USA. Bearing bolt P/N 111904-9-519B, left landing gear
G328	Douglas DC-3	12 Jul 72	0	S	Wapenamanda, Papua, New Guinea. Starboard gear Y fitting P/N 2116632 (bolt hole)
G485	Douglas DC-3C	22 Jul 79	0	S	Tampa, Fla. USA. Both arms of right gear, rear strut, P/N 211632-1.
	Engine Mounts				
H2	Douglas DC-3 Dakota (Canadian Forces)	14 May 51	4	D	Lac Boltier, Que. Canada. Engine bearers & reduction gear housing cracked. Port engine fell out, fracturing front spar, & port wing separated. Crack origin: engine-mount welds.

DOUGLAS DC-4

	Engine				
E89	Douglas DC-4	22 Sep 66	2	D	Bogota, Colombia. Failure of a number of teeth of pinion of governor control unit, causing engine overspeed
	Landing Gear				
G91	Douglas DC-4	19 Nov 64	0	S	Norfolk, Va. USA. Right nosewheel yoke end fitting. 5568 hr on part

G235	Douglas DC-4	26 Jun 68	0	S	Launcestron, Australia. Bolt attaching lower torque link to nose-wheel fork.

DOUGLAS DC-6

	Wing				
A34	Douglas DC-6	1952	0	S	? Failure of front spar cap, and bottom skin and stringer panel between front & centre spar cap. Origin: bolt hole connecting engine attachment angle to front spar. Material: 75ST. 13,000 airframe hours. Aircraft landed safely.
	Fuselage				
C19	Douglas DC-6B	24 Feb 67	0	S	North Holmdel, N.J. USA. Fuselage: skin and attachments, 60" x 125" hole torn aft crew compartment door. 37,264 airframe hours.
	Propeller				
F5	Douglas DC-6	21 Aug 50	1	S	Eagle, Colo. USA. Propeller blade. Origin: scratch on blade.
F10	Douglas DC-6A	21 Jun 59	0	D	Shannon, Ireland. No. 1 blade of no. 4 prop. Previous blade bending disrupted compressive stresses in shot peened area.
F17	Douglas DC-6B	14 Apr 64	0	S	Melbourne, Australia. No. 3 blade of no. 3 prop (8.5" from butt end). Origin: surface burn (electrical?).
F165	Douglas DC-6	8 Feb 76	3	D	Van Nuys, Calif. USA. Prop blade. Leading edge under de-icer boot.
	Landing Gear				
G31	Douglas DC-6B	26 Jun 61	0	S	Miami, USA. Landing gear uplatch release cable.
G36	Douglas DC-6	7 Mar 62	0	S	Buffalo, NY. USA. Right main-gear oleo strut.
G121	Douglas DC-6A	15 Aug 65	0	S	Boston, Mass. USA. Nose gear scissor torque link. P/N 8488A-46-1.
G199	Douglas DC-6B	22 Feb 67	0	S	Martha's Vineyard, Mass. USA. Left landing gear strut piston.
G283	Douglas DC-6B	5 Nov 70	0	D	Kerkyra, Greece. Upper torque link of nose gear.
G292	Douglas DC-6B	19 Dec 70	0	S	Malaga, Spain. Attachment fitting securing the recovery spring cable to lower end of left landing gear leg.
G407	Douglas DC-6B	24 Sep 75	0	S	Cleveland, Oh. USA. Corner radius of reworked nose gear assembly.

G505	Douglas DC-6	10 Jun 80	0	S	Indianapolis, In. USA. Nosewheel steering, upper torque link. P/N 8488A-46-1.

DOUGLAS DC-7

	Fuselage				
C8	Douglas DC-7	18 Jan 57	0	S	New Orleans, La. USA. Mild explosive decompression. Fuselage cracks in area of forward crew entrance & cargo doors
	Engine				
E12	Douglas DC-7C	29 Oct 57	0	S	Off US coast, NY/Copenhagen. No. 1 engine impeller drive gear.
E14	Douglas DC-7C	25 Mar 58	9	D	Miami Fla. USA. No. 11 cylinder of no. 3 engine, approx 1 1/2 inches above mounting flange on thrust side.
	Landing Gear				
G40	Douglas DC-7B	12 Mar 63	0	S	Boston, Mass. USA. Right main l/g shock strut cylinder at fillet of torque link lugs. 14,000 hours.

DOUGLAS DC-8 (See McDonnell Douglas DC-8)

DOUGLAS DC-9 (See McDonnell Douglas DC-9)

DUTTON SPL J-4

	Engine				
E114	Dutton SPL J-4	13 Apr 69	0	S	Mesa, Ariz. USA. Crankshaft at propeller flange. (Previous damage)

DYKE DELTA

	Engine				
E315	Dyke JD-1 Delta	5 Aug 78	0	S	Fort Bridger, Wy. USA. Exhaust muffler broke loose from fatigue.
	Landing Gear				
G466	Dyke Delta JD-2	6 Aug 78	0	S	Little Rock, Ark. USA. Gear locking mechanism: forward bottom portion of landing gear handle.

ERCO ERCOUPE 415-C

	Flight Controls				
D25	Erco 415-C Ercoupe	22 Mar 75	1	D	Fulton, Mo. USA. Right aileron push-pull control rod broken.
D32	Erco 415-C Ercoupe	15 Jun 77	2	D	New Bedford, Mass. USA Left horizontal member of T-control yoke (weld). Hydrogen embrittlement & fatigue.
	Propeller				
F29	Ercoupe 415C	6 May 65	0	S	Carlsbad, Cal. USA. Propeller failure (taper hub), improperly secured prop hub bolts.
	Landing Gear				
G255	Erco 415-C Ercoupe	29 Jun 69	0	S	Bradford, Pa. USA. Nose wheel steering ball joint fitting.

FAIRCHILD C-119 PACKET

F7	Propeller Fairchild C-119 Packet	Nov 52	9	?	Billings, Montana USA. Propeller blade broke 46 inches from tip. Vibration pulled engine out of nacelle.

FAIRCHILD F-27 (See Fokker F-27)

FAIRCHILD SWEARINGEN (See Swearingen)

FAIREY GANNET

B10	Tail Fairey Gannet (RAN)	30 Jan 59	1	D	Sydney, Australia. Tail plane assembly detached.
H10	Arrestor Hook Fairey Gannet (RAN)	23 Mar 65	1	D	At sea, HMAS Melbourne. Bill of arrestor hook broke during landing.

FFA DIAMANT (SAILPLANE)

A120	Wing FFA Diamant 16.5 sailplane	17 Apr 77	1	D	Omemee, Ont., Canada Separation of right wing. Crack in root web. Areas of root web had a lack of bonding. Material: fiberglass. Airframe hours: 784.

FLEET MODEL 1

F36	Propeller Fleet Model 1	15 May 66	0	S	St. Petersburg, Fla. USA. Propeller hub.

FLEET MODEL 80 CANUCK

E25	Engine Fleet 80 Canuck	9 Oct 61	0	S	Trinity Bay, Que. Canada. Left-rear cylinder hold down studs.
G204	Landing Gear Fleet 80 Canuck (skis)	24 Mar 67	0	S	Wawa, Ont. Canada. Left undercarriage axle at machine mark.

FLETCHER FU-24

E174	Engine Fletcher FU-24	14 Sep 72	0	S	Ngaroma, New Zealand. Camshaft gear, P/N 632893.
F96	Propeller Fletcher FU-24-950	10 May 71	0	S	Capr Runaway, New Zealand. Pitch-change actuating pin of propeller blade (root radius).
F120	Fletcher FU-24	3 Apr 73	0	S	Waotu, New Zealand. Propeller at blade root.

	Landing Gear				
G421	Fletcher FU-24	21 Jan 76	0	S	Palmerston North, New Zealand. Brackets which attach to piston & scissors link (weld).

FOKKER DR-1

	Tail				
B26	Fokker DR-1	14 Jul 74	0	S	Tehachapi, Cal. USA. Rudder post failed above upper hinge. Rudder folded to horizontal position.

FOKKER F-27 FRIENDSHIP

	Wing				
A87	Fairchild Hiller F-27B	2 Dec 68	39	D	Pedro Bay, Alaska, USA. Separation of right wing, WS 197. Cracks at fastener holes in wing skin at tank access door
	Engine				
E177	Fokker F-27	15 Oct 72	0	S	Rome, Italy. Low pressure impeller.
E203	Fokker F-27	6 Mar 74	0	S	Khartoum, Sudan. Rear hub face of impeller (fretting). No. 2 engine.
E331	Fokker F-27	29 Mar 79	17	D	Quebec City, Que. Canada. Engine failure from crack in engine compressor, low-pressure impellor, Dart engine.
	Landing Gear				
G28	Fokker F-27	17 Feb 61	0	S	Goldsboro, N.C. USA. Upper drag strut hinge pin bolt (right gear).
G479	Fokker F-27	10 Mar 79	0	S	Birmingham Airport, UK. Nose gear attachment lugs (corrosion pit).

FOLLAND GNAT

	Tail				
B18	Folland Gnat T Mk 1 (Royal AF)	13 Dec 71	2	D	Upper Heyford, UK. Fin separated (attachment lugs). Role: aerobatic demonstration team.

FUJI FA 200 AERO SUBARU

	Propeller				
F143	Fuji FA 200-180 Aero Subaru	6 Mar 75	0	S	Hokkaido, Japan. Screw parts of #2 prop hub.
F160	Fuji FA 200-160 Aero Subaru	10 Nov 75	0	S	Oita, Japan. Prop blade (stone pit at back side).

FUNK F-23

	Propeller				
F54	Funk F-23A	26 Jun 67	0	S	Alliance, Neb. USA. Propeller hub at blade attach point.

GENERAL AIRCRAFT CYGNET II

Engine

E120	General Aircraft 42 Cygnet II	26 Aug 69	2	D	Woerth, Bas-Rhin, France. No. 3 connecting rod.

GENERAL DYNAMICS F-16

Engine

E354	General Dynamics F-16 (USAF)	26 Mar 80	0	D	Hill AFB, Utah USA. 9th stage compressor disk on Pratt & Whitney F100 engine. Engine time: 258.3 hours.

GENERAL DYNAMICS F-111

Wing

A91	General Dynamics F-111A (USAF)	22 Dec 69	2	D	Nellis AFB, Nevada USA. Left wing separated. Lower attachment plate of wing pivot assembly contained an initial flaw (D6ac steel). Airframe hours: 105.

Flight Controls

D15	General Dynamics F-111A (USAF)	28 Mar 68	2	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Aircraft not recovered.
D16	General Dynamics F-111A (USAF)	30 Mar 68	0	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. A/c not recovered.
D17	General Dynamics F-111A (USAF)	22 Apr 68	2	D	Thailand. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane. Aircraft not recovered.
D18	General Dynamics F-111A (USAF)	8 May 68	0	D	Nevada, USA. Failure in lock weld on rod end in control valve assembly controlling hydraulic actuators of tailplane.

GLASFLUEGEL STANDARD LIBELLE (SAILPLANE)

Flight Controls

D42	Glasfluegel Standard Libelle	1 May 80	0	S	Tauberbischofsh, W. Germany. Elevator drive in region of stick.

GLENDENING STITS (See Stits)

GLOBE GC-1B

Engine

E45	Globe GC-1B	27 Mar 65	0	S	New Carlisle, Ohio. USA. No. 2 piston.
E195	Globe GC-1B	28 Jul 73	0	D	Ballston Spa, N.Y. USA. Fuel line to carburettor.
E280	Globe GC-1A	5 Jun 77	1	S	Erding, West Germany. Rocker arm for exhaust valve.

Propeller

F137	Globe GC-1B	20 Aug 74	1	S	Manchester, Tenn. USA. Prop hub, 21 inches from clamp assembly strap.

Landing Gear

G240	Globe GC-1B	12 Oct 68	0	S	Washburn, Iowa, USA. Right gear actuating arm.

GREAT LAKES SPORT TRAINER

Landing Gear

G131	Great Lakes 2T-1E	30 Sep 65	0	S	Spokane, Wash. USA. Right main gear.

GRUMMAN AA-5 (See American AA-5)

GRUMMAN AGCAT

Engine

E52	Grumman G-164 AgCat	8 Jun 65	0	S	Tallulah, La. USA. No. 4 cylinder connecting rod.
E80	Grumman G-164 AgCat	20 Apr 66	0	S	Butte City, Cal. USA. Wrist pin and link rod no. 1 cylinder.
E107	Grumman G-164A AgCat	16 Sep 68	0	S	Ferriday, La. USA. No. 9 cylinder head.
E190	Grumman G-164 AgCat	30 Mar 73	0	S	Knights Landing, Cal. USA. No. 9 cylinder.
E192	Grumman G-164 AgCat	2 Jun 73	0	S	Church Point, La. USA. Crankshaft.
E302	Grumman G-164 AgCat	11 May 78	0	S	Elton, La. USA. Engine cylinder assembly.
E355	Grumman G-164B AgCat	19 Apr 80	0	D	Billings, Mont. USA. Mixture push-pull rod fractured at thread.
E356	Grumman G-164 AgCat	26 Apr 80	0	S	Palermo, Ca. USA. No. 1 cylinder head.
E362	Grumman G-164 AgCat	30 Jul 80	0	S	Samson, Al. USA. Crankshaft, front counterweight assembly.

Propeller

F198	Grumman G-164 AgCat	23 May 78	0	S	Iowa, La. USA. 18 inches missing from blade AG100-2.

Landing Gear

G67	Grumman G-164 AgCat	8 Jul 64	0	S	Port Lavaca, Tex. USA. Gear spring leg at axle attach bolt holes.
G170	Grumman G-164 AgCat	29 Apr 66	0	S	Abbeville, La. USA. Main landing gear.
G188	Grumman G-164 AgCat	8 Sep 66	0	S	McAdoo, Tex. USA. Left landing gear at fuselage attach point.

G232	Grumman G-164 AgCat	8 May 68	0	S	Elton, La. USA. Left main gear.
G302	Grumman 164A AgCat	1971	0	S	Dayboro, Qld. Australia. Gear collapsed.
G311	Grumman G-164 AgCat	14 Aug 71	0	S	Buttonwillow, Cal. USA. Left gear leg.
G312	Grumman G-164 AgCat	17 Aug 71	0	S	Davis, Cal. USA. Main landing gear.
G347	Grumman G-164 AgCat	12 Mar 73	0	S	Hockley, Tex. USA. Landing gear P/N A-1530-12 broke 18" below attachment.
G383	Grumman G-164 AgCat	21 Aug 74	0	S	Davis, Cal. USA. Right gear leg.
G414	Grumman G-164A AgCat	23 Dec 75	0	S	Zellwood, Fla. USA. Main landing gear.
G427	Grumman G-164A AgCat	19 Apr 76	0	S	Kaplan, La. USA. Right gear leg.
G464	Grumman G-164A AgCat	13 Jun 78	0	S	Pine Prairie, La. USA. Landing gear bolts P/N MS20008H22 and P/N AN509616-35.
	Miscellaneous				
H24	Grumman G-164 AgCat	1977	0	S	Wee Waa NSW, Australia. Aircraft ground looped. Left leg detached. Flexible hose from brake master cylinder in perished condition.

GRUMMAN AVENGER

	Engine				
E131	Grumman TBM-3 Avenger	21 Jun 70	1	D	St. Martin, N.B. Canada. Front bank master rod.
E337	Grumman TBM-3E Avenger	15 Jun 79	0	D	Sevogle, NB, Canada. Carburettor hot air door in air intake duct broke off and blocked carb intake. Origin: bolt holes. 2205 airframe hours.
	Propeller				
F183	Grumman TBM-3E Avenger	9 Jun 77	0	D	Blissville, N.B. Canada. Hamilton-Standard constant-speed propeller blade failure. Corrosion-induced fatigue. Engine separated. 3271 airframe hours.

GRUMMAN GOOSE

	Flight Controls				
D38	Grumman G-21A Goose	17 Sep 79	1	S	Avalon, Calif. USA. Up elevator cable separated 3 to 4 ft. forward of station 29.

Engine

E316	Grumman G-21A Goose	2 Sep 78	4	D	St. Thomas, Virgin Islands. Fatigue fracture, cylinder assembly. Aircraft beyond required inspection time. Total time on engine: 602.3 hours.

Propeller

F13	Grumman G-21A Goose	17 Jul 62	0	S	Catalina Is., Cal. USA. No. 3 prop blade (blade retention flange radius at blade trailing edge). Cause: vibration from rotation of blade within retention clamp.

GRUMMAN MALLARD

Hydraulic Line

H4	Grumman G-73 Mallard	20 Mar 64	0	S	Key West Airport, Fla. USA. Main hydraulic pressure line tee fitting.
H5	Grumman G-73 Mallard	20 Mar 64	0	S	West Palm Beach Airport, Fla. USA. Hydraulic line (tool damage)

GRUMMAN OV-1 MOHAWK

Engine

E173	Grumman OV-1D Mohawk (US Army)	12 Aug 72	1	D	Vn. USA. Engine (disc).

GRUMMAN TRACKER

Landing Gear

G448	Grumman S2E Tracker (RAN)	29 Aug 77	0	S	At sea, HMAS Melbourne. Nose wheel trunnion.

GRUMMAN WIDGEON

Fuselage

C23	Grumman G-44 Widgeon	30 Dec 78	0	S	Waitemata, New Zealand. Section of hull plating immediately forward of the step failed. Fatigue & stress corrosion.

Engine

E78	Grumman G-44 Widgeon	15 Mar 66	0	S	Port Alberni, B.C. Canada. Crankshaft at grinding crack in cheek of fillet of no. 4 bearing journal.

Landing Gear

G459	Grumman G-44 Widgeon	14 Feb 78	0	S	Pilot Point, Ak. USA. Right main gear retract strut.

HAL PUSHPAK

Wing

A80	HAL Pushpak	Sep 67	?	D	Jaipur, India. Wing failure. Lift strut lower-rear attach lug.

HALL CHEROKEE II (SAILPLANE)

Wing

A135	Hall Cherokee II (sailplane)	2 May 81	1	D	Valyermo, Ca. USA. Glider pitched up, breaking tow rope. Wings separated. Pre-existing cracks in wood spars.

HANDLEY PAGE W.10

	Tail				
B2	Handley Page W.10	22 Sep 34	4	D	Aston Clinton, England. Fracture of main bolt securing the bracing wire to front spar of tailplane, allowing tailplane to twist. 5000 airframe hours. Bolts made from mild steel and improperly marked as high-tensile steel.
	Engine				
E1	Handley Page W.10	17 Jun 29	7	D	English Channel near Dungeness, England. Steel studs in front big-end bearing of starboard engine.

HANDLEY PAGE H.P.50 HEYFORD

	Landing Gear				
G1	Handley Page H.P. 50 Heyford Mk. 1 (RAF)	10 Jun 32	?	?	Upper Heyford, UK. Starboard outer end of lower centre-section front spar failed (fatigue), causing undercarriage to collapse.

HANDLEY PAGE H.P.67 HASTINGS

	Flight Controls				
B8	Handley Page Hastings C.1 (RAF)	Jan 53	?	?	Fayid, Egypt. Elevator outer hinge-bolts.
B13	Handley Page Hastings (RAF)	6 Jul 65	41	D	Dorchester, England. Upper two attachment bolts of starboard elevator outrigger.

HANDLEY PAGE H.P.80 VICTOR

	Tail				
B9	Handley Page H.P.80 Victor prototype	14 Jul 54	4	D	Cranfield, UK. Tailplane separated. Cracks around bolt holes in fin allowed 3 bolts securing tailplane to loosen and shear.

HANDLEY PAGE H.P.81 HERMES

	Engine				
E8	Handley Page Hermes IV	23 Jul 52	0	D	Pithiviers, France. Crankshaft web.
E9	Handley Page Hermes IV	25 Aug 52	7	D	Trapani, Sicily. Crankshaft web.

HANDLEY PAGE H.P.R.7 HERALD

	Landing Gear				
G357	Handley Page Herald	4 Sep 73	0	S	Gatwick, UK. Front pressure bulkhead around nose gear downlock failed, allowing downlock catch to spring out.
G405	Handley Page Herald	28 Aug 75	0	S	Tel Aviv, Israel. Right main gear actuating hydraulic cylinder.

HANDLEY PAGE H.P.137 JETSTREAM

	Engine				
E123	Handley Page Jetstream	6 Mar 70	11	D	Samedan, Switzerland. 1st stage turbine disc of left engine (Turbomeca Astanou XVI). Material: Udimet 500.

HAWKER TYPHOON

	Tail				
B3	Hawker Typhoon (RAF)	WW II	1	D	UK? Tail failure. Origin: rivet hole. Possibly several additional accidents.

HAWKER SIDDLEY ARGOSY (See Armstrong Whitworth Argosy)

HAWKER SIDDLEY HARRIER

	Flight Controls				
D23	Hawker Siddley Harrier GR.3 (RAF)	23 Jan 74	1	D	Wildenrath, West Germany. Starboard flap mechanical drive system.
D45	Hawker Siddley Harrier GR.3 (RAF)	14 Oct 80	1	D	Gutersloh, W. Germany. Failure of roll reaction control rod from starboard aileron to roll reaction shutter.
	Engine				
E370	H.S. Harrier GR.3 (RAF)	28 Oct 80	0	D	Kaleborn, W. Germany. FOD damage to fan, fatigue cracks propagated from impact mark, h.p. compressor blade failed.

HAWKER SIDDLEY HS 748

	Wing				
A117	Hawker Siddley HS 748	14 Apr 76	34	D	Cutral-Co, Argentina. Separation of right wing. Crack origin at rivet holes of reinforcing plate by external rib of engine. Matl: BS L72. Airframe hours: 25,760.
	Engine				
E225	Hawker Siddley HS 748	3 Feb 75	33	D	Manila, Philippines. 3 bridges in the flame tube of no. 5 combustion chamber failed, causing fire.

HELIO H-250 COURIER II

	Landing Gear				
G510	Helio H-250 Courier II	8 Aug 80	0	S	Keith Bay, NWT. Canada. Wheel axle.

HELIO H-295/H-395 SUPER COURIER

	Wing				
A100	Helio H-295 Super Courier	21 Aug 71	3	D	Sitka, Alaska, USA. Separation of left wing. Lower attachment fitting P/N 391-030-4072

A122	Helio H-295 Super Courier	15 Aug 78	4	D	Amai Inlet, BC, Canada. Separation of wing. Lower left carry-through fitting in bottom portion of lug at wing-attachment bolt hole. Origin: corrosion pitting in bolt hole bore. Aircraft damaged in prior accident. 1178 airframe hours.
	Engine				
E17	Helio H-395 Super Courier	16 Sep 59	0	S	McMurray, Alta. Canada. Connecting rod bearing cap retaining bolt, P/N 60007.
E96	Helio 395A Super Courier	30 Jul 67	0	?	Cullaton Lake, NWT. Canada. No. 4 cylinder exhaust valve.

HELIO 391 COURIER

	Engine				
E20	Helio H-391B Courier	19 May 60	0	S	Watson Lake, Y.T. Canada. Movement between stationary gear plate and reduction gear housing permitted severe engine vibration and fatigue failure of bolts.
	Landing Gear				
G180	Helio H-391B Courier	2 Aug 66	0	S	Van Nuys, Cal. USA. Right strut failed. Flown extensively from rough fields.

HIRTH ACROSTAR

	Control System				
D24	Hirth Acrostar Mk 2	4 Jul 74	1	D	Straubing-Wallm. West Germany. Failure of control system. Unapproved modification.
D48	Hirth Acrostar	19 Sep 82	0	D	Pau, France. Tube in which (elevator) stick is mounted was broken on one side.

HOWARD DGA-15

	Landing Gear				
G79	Howard DGA-15P	20 Sep 64	0	D	Deridder, La. USA. Left gear attach fitting, main gear.
G538	Howard DGA-15 Nightingale	26 Oct 81	0	S	Dryden, Ont. Canada. Left main gear upper strut.

ILYUSHIN Il-62

	Engine				
E353	Ilyushin IL-62	14 Mar 80	87	D	Warsaw, Poland. Failure of shaft of no. 2 engine, damaging 2 other engines & control system for tail surfaces.

INTERMOUNT A9A

	Landing Gear				
G337	Intermount A9A	1973	0	S	Bridgetown WA, Australia. Bottom shock strut terminal, port gear.

INTERSTATE S1B1

Landing Gear

G424	Interstate S1B1	26 Feb 76	0	S	Wasilla, Alas. USA. Landing gear failed. Rust found along break.

JODEL (See S.A.N. Jodel)

JUNKERS F.13

Tail

B1	Junkers F.13	21 Jul 30	6	D	Meopham, Kent UK. Breakage of tailplane from severe buffeting from air eddies produced by the wing.

JUNKERS JU 52

Wing

A24	Junkers Ju 52	WW II 1943?	?	D	S. America. Wing failure. Spar at a riveted construction in the tension chord.

LAKE LA-4

Oil Line

H13	Lake LA-4	16 Sep 67	0	S	Flesherton, Ont. Canada. Propeller governor oil line tube (fretting) caused engine oil starvation.

LATECOERE 631

Flight Controls

D1	Latecoere 631	28 Mar 50	12	D	Cape Ferrett, France. Aileron control couplings, port wing.

LET L-13 BLANIK (SAILPLANE)

Wing

A123	Let L-13 Blanik sailplane	19 Nov 78	0	D	Kamp-Lintfort, W. Germany. Spar failure, left wing, during looping. Fatigue probably because of earlier over-stress. Occupants parachuted.

LOCKHEED CONSTELLATION/SUPER CONSTELLATION

Fuselage

C9	Lockheed Constellation	1958	0	S	? Aft pressure bulkhead. Crack propagated completely around circumference of bulkhead. Origin: corrosion in toilet area. 37,000 hours.

Engine

E4	Lockheed 049 Constellation	18 Jun 47	14	D	Mayadine, Syria. No. 18 exhaust rocker arm of no. 1 engine.

Propeller

F3	Lockheed L-049 Constellation	18 Nov 47	5	D	New Castle, Delaware USA. Propeller blade.
F4	Lockheed L-649 Constellation	7 Feb 48	1	S	Bunnell, Fla. USA. Propeller blade.

F8	Lockheed L-749A Constellation	3 Aug 53	4	D	Fethiye, Turkey. Propeller blade.
	Landing Gear				
G8	Lockheed L-749 Constellation	18 Dec 58	0	S	Atlanta, Ga. USA. Lower drag strut terminal for P/N 299284 of right main gear.
G9	Lockheed L-1049	17 Jan 59	0	S	Olathe, Kan. USA. Landing gear down-lock strut.
G19	Lockheed L-749	3 Jan 60	0	S	Philidelphia Pa. USA. Right gear strut cylinder.
G20	Lockheed L-749	4 Jan 60	0	S	Washington, D.C. USA. Right gear strut cylinder.
G22	Lockheed L-1049G	29 Feb 60	0	S	Chicago, Ill. USA. Drag strut of right main gear.
G32	Lockheed L-1049G Super Constellation	3 Aug 61	0	D	New York, N.Y. USA. Upper cap weld of right landing gear shock strut cylinder.
G37	Lockheed L-1049	28 May 62	0	S	New York, USA. Bolt attaching nose gear to drag strut.
G49	Lockheed 749 Constellation	9 Mar 64	0	S	Boston, Mass. USA. Stress corrosion and fatigue failure of nose gear actuating strut piston rod end clevis.
G76	Lockheed L-749	9 Sep 64	0	S	Boston, Mass. USA. Nose gear actuating strut.

LOCKHEED ELECTRA

	Fuselage				
C25	Lockheed L-188 Electra	18 Jan 80	0	S	Syracuse, N.Y. USA. Forward cargo door, door latch loop (fastener holes). 34,794 airframe hours, 16,469 landings.
	Propeller				
F25	Lockheed L-188 Electra	15 Feb 65	0	S	Okarche, Okla. USA. Propeller, manufacturer defect.
	Landing Gear				
G178	Lockheed L-188A Electra	21 Jul 66	0	S	Fort Worth, Tex. USA. Left main gear door actuating piston.

LOCKHEED C-5A GALAXY

	Engine				
E406	Lockheed C-5A Galaxy (USAF)	May- Oct 82	?	?	USA? Cracking in compressor rear frames, GE TF39-1C engine. Fire caused $400,000 damage.
E407	Lockheed C-5A Galaxy (USAF)	May- Oct 82	?	?	USA? Cracking in compressor rear frames, GE TF39-1C engine. Fire caused $1,200,000 damage.

	Pylon				
H19	Lockheed C-5A Galaxy (USAF)	29 Sep 71	0	S	Altus AFB, Okla., USA. Engine pylon fatigue failure during ground runup. Outboard truss member in aft pylon mount. 1275 airframe hours, 3100 landings.

LOCKHEED HERCULES

	Wing				
A112	Lockheed 382E Hercules	23 May 74	4	D	Springfield, Ill. USA. Separation of port wing. Outer WS 162, lower front spar cap. Origin: first fastener hole. Material: 7075-T6511. Airframe hours: 18,837.
A114	Lockheed 382B Hercules	30 Oct 74	4	D	Bettles, Alaska, USA. Separation of right wing. Fastener holes in lower hat section, skin panels, no. 3 engine compressor diffuser case, centre WS 183.
	Fuselage				
C18	Lockheed C-130 Hercules (Canadian Forces)	15 Apr 66	0	D	Borden, Sask. Canada. Explosive decompression of fuselage. Forward cargo door missing. Failure of #1 eye bolt. Origin: stress concentration (poor machining).
	Landing Gear				
G349	Lockheed 382G Hercules	17 Mar 73	0	S	Pensacola, Fla. USA. Nose gear cylinder. Origin: stress-corrosion pits.

LOCKHEED 18 LODESTAR

	Engine				
E115	Lockheed 18-56 Lodestar	17 Apr 69	0	S	Port Hardy, B.C. Canada. Piston link rod, left engine.

LOCKHEED T-33/TV-2 SILVER STAR

	Wing				
A49	Lockheed/ Canadair T-33 Silver Star (Canadian Forces)	29 May 57	1	D	Zweibrucken, Germany. Port wing failed from crack in spar cap (lower front) near attachment fitting.
	Fuselage				
C1	Lockheed T-33 Silver Star (USAF)	1953-59	?	?	? Fuselage failure.
	Engine				
E140	Lockheed TV-2	4 Dec 70	0	D	Cheyenne, Wyo. USA. Fatigue fracture, turbine assembly retention, blade.

LOCKHEED F-104 STARFIGHTER

	Wing				
A89	Lockheed F-104G (German AF)	pre-Dec/69	1	D	Luke AFB, USA. Separation of right wing. Lower skin access cutout, WS 80.7.

A97	Lockheed CF-104 Starfighter (Canadian Forces)	25 Mar 71	0	D	Cold Lake, Alta. Canada. Wing failure (lower skin). Skin had wrong grain direction.
	Leading Edge Flap				
D44	Lockheed CF-104 Starfighter (Canadian Forces)	27 Aug 80	0	D	Terschelling Is., Netherlands. Left leading-edge flap separated. Failure of forward beam hinge lobes.
	Engine				
E56	Lockheed CF-104 Starfighter (Canadian Forces)	5 Jul 65	0	D	Zweibrucken, Germany. Main fuel pump drive splines (lack of lubrication).

LOCKHEED L-1011 TRISTAR

	Wheel				
G516	Lockheed L1011 TriStar	23 Dec 80	2	S	Qatar. Main landing gear, inboard wheel flange failed, resulting in explosive decompression of cabin.

LTV A-7 CORSAIR II (See Vought Corsair II)

LUSCOMBE 8

	Tail				
B35	Luscombe 8A	28 Oct 79	0	D	Fredericksburg, Texas USA. Vertical stabilizer & rudder separated (attachment failure).
	Flight Controls				
D8	Luscombe 8A	16 Jan 65	0	S	Colliston, Utah. USA. Left rudder cable.
	Engine				
E48	Luscombe 8C	18 Apr 65	0	D	Laguna Beach, Calif. USA. Engine crankshaft.
E81	Luscombe 8E	15 May 66	0	S	Eau Gallie, Fla. USA. Crankshaft cluster gear attaching screws.
E92	Luscombe 8E	23 Apr 67	0	D	Laguna Beach, Calif. USA. Camshaft rear bearing journal in area of flange fillet.
	Landing Gear				
G179	Luscombe 8A	22 Jul 66	0	S	Titusville, Fla. USA. Left landing gear drag brace bolt.
G236	Luscombe 8A	13 Jul 68	0	S	Longwood, Fla. USA. Left gear jack strut attach bolt.
G361	Luscombe 8A	4 Nov 73	0	S	Denton, Tex. USA. Front left landing gear attachment.
G411	Luscombe 8A	18 Oct 75	0	S	Willow, Ark. USA. Right float attach fitting.
G443	Luscombe 8C	27 Mar 77	0	S	Pittsfield, Ma. USA. Landing gear struts.

G449	Luscombe 8E	3 Sep 77	0	S	Mormon Lake, Ariz. USA. Main landing gear.

MARTIN 2-0-2

Wing

A28	Martin 2-0-2	29 Aug 48	37	D	Winona, Minn., USA. Outer panel, left wing separated. Lower front wing root fitting. Material: 75ST. Airframe hours: 1542.

MARTIN 4-0-4

Landing Gear

G21	Martin 4-0-4	28 Feb 60	0	S	Olathe Kan. USA. Left main gear gland nut.

MARTIN B-57

Fuselage

C3	Martin B-57 (USAF)	1953-59	?	?	? Fuselage failure.

MAULE M-4 ROCKET

Tail

B30	Maule M-4-210C	30 Apr 78	1	S	Bethel, Alaska USA. Left horizontal stabilizer.

Landing Gear

G116	Maule M-4	3 Jul 65	0	S	Moorpark, Cal. USA. Right center shock strut.
G123	Maule M-4	21 Aug 65	0	S	Columbus, Ohio. USA. Right landing gear shock strut.
G359	Maule M-4-220C	23 Sep 73	0	S	Bethel, Alas. USA. Main gear.
G372	Maule M-4-210C	14 Apr 74	0	S	Aalen-Heidenheim, W. Germany. Tail landing gear.

MAULE M-5 LUNAR ROCKET

Flight Controls

D46	Maule M-5	1981	0	S	Bankstown NSW, Australia. Right rudder-pedal torque tube (weld).

MBB BO 209 MONSUN

Landing Gear

G385	MBB BO 209 Monsun	5 Oct 74	0	S	Koenigsdorf, W. Germany. Nose gear strut attachment.

MCDONNELL F-101 VOODOO

Engine

E143	McDonnell CF-101 Voodoo (Canadian Forces)	18 Feb 71	0	D	Comox. B.C. Canada. Starboard J57 engine compressor blade. Origin: platform area.

E230	McDonnell CF-101 Voodoo (Canadian Forces)	14 May 75	0	D	Bagotville, Que. Canada. Starboard engine caught fire during afterburner. Crack adjacent to axial weld of engine casing.

MCDONNELL DOUGLAS DC-8

Flap

D41	McDonnell Douglas DC-8-61	13 Jan 80	0	S	Gander, Nfld., Canada. Left flap support fitting at station XF219.498 fractured, and 2 flap hinge base fittings at station XW97.906 fractured.

Engine

E121	Douglas DC-8	28 Nov 69	0	S	Newark, N.J. USA. 12th stage compressor disc, no. 4 engine.
E125	McDonnell Douglas DC-8-60	19 Apr 70	0	D	Rome, Italy. Hub 1st stage fans of no. 1 engine. Ejected metal parts damaged pylon of no. 2 engine, and started fire.

Landing Gear

G95	Douglas DC-8	8 Jan 65	0	S	San Juan, Puerto Rico. Right main landing gear axle beam. Service hours: 8943. P/N 5819123-4.
G260	Douglas DC-8	17 Sep 69	0	S	Dallas, Tex. USA. Landing gear lower lug of forward bogie beam.
G450	Douglas DC-8-61	2 Oct 77	0	S	Shannon Airport, Limerick, Ireland. Inboard half of #3 wheel rim.
G517	Douglas DC-8	29 Dec 80	0	S	Phoenix, Az. USA. Stress corrosion fatigue failure of right main gear bogie beam P/N 5774700-500.

MCDONNELL DOUGLAS DC-9

Fuselage

C24	Douglas DC-9-32	17 Sep 79	0	S	Between Boston USA & Yarmouth NS, Canada. Fatigue fracture of aft cabin pressure bulkhead (explosive decompression). Origin: rivet hole below aft bulkhead access door. Crack missed in prior inspections. 28,425 airframe hrs, 26,816 landings. Matl: Alclad 2014-T6.

Engine

E165	Douglas DC-9	19 Mar 72	0	S	Atlanta, Ga. USA. Second stage compressor disc (# 2 engine). Separated at rear fan case.

MCDONNELL DOUGLAS DC-10

Pylon

H33	McDonnell Douglas DC-10	25 May 79	273	D	Chicago, Ill. USA Pylon failed & engine separated. Crack caused by faulty maintenance and propagated by fatigue. Airframe hours: 19,871.

MCDONNELL DOUGLAS F-4 PHANTOM II

Wing

A90	McDonnell F-4 Phantom II (USAF)	16 Dec 69	0	S	USA? Failure of left outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 1700 airframe hours.
A93	McDonnell F-4 Phantom II (USAF)	26 Feb 70	0	S	USA? Failure of left outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 1259 airframe hours.
A94	McDonnell F-4 Phantom II (USAF)	18 Mar 70	0	S	USA? Failure of right outer wing. Knife-edge fastener holes in lower torque-box skin, outboard lower wing. Aircraft recovered safely. 464 airframe hours.
A105	McDonnell F-4 Phantom II (USAF)	Jan 73	?	D	Nellis AFB, USA Port wing failure, lower lock lug.
A118	McDonnell Douglas F-4M Phantom II (RAF)	23 Jul 76	0	D	Coningsby, UK. Wing failure. Outer wing fold lug, aft lock lug. Loads caused by buffeting.

Tail

B19	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. 500 airframe hours. Aircraft recovered safely.
B20	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. Aircraft recovered safely.
B21	McDonnell Douglas F-4 Phantom II (USAF)	pre-1972	0	S	? Outer portion of stabilator separated at SS 51.85 splice rib. Origin: aft edge of Al skin. 1540 airframe hours. Aircraft recovered safely.

MCDONNELL DOUGLAS F-18 HORNET

Engine

E367	McDonnell Douglas TF/A-18 Hornet (US Navy)	8 Sep 80	0	D	Middle Wallop, England. Low-pressure turbine disk of right GE F404 engine. Crack began at large undetected flaw. Material: Rene 95.

MEYERS 200 (See Aero Commander 200)

MEYERS MAC 145

Brake System

H6	Meyers MAC 145	2 May 64	0	S	Chicago, Ill. USA. Right brake master cylinder actuating rod.

MIDGET MUSTANG (See Bushby/Long Midget Mustang)

MILES M.65 GEMINI

Engine

E15	Miles M.65 Gemini	4 Mar 59	1	D	Panshanger Aerodrome, Hertford U.K. Crankshaft of starboard engine.

MITSUBISHI MU-2

Propeller

F225	Mitsubishi MU-2J	30 Nov 80	0	D	Port Aransas, Tex. USA. Prop blade. Origin: stress corrosion crack.

MOONEY M-18

Wing

A72	Mooney M-18C	31 Mar 64	1	D	Roanoke Rapids, N.C. USA. Wing failure (spar).

Landing Gear

G101	Mooney M-18L	30 Jan 65	0	S	Pacoima, Cal. USA. Right main gear operating arm (weld).

MOONEY M-20

Engine

E119	Mooney M20C	23 Jun 69	1	D	Banff, Alta. Canada. Engine failure, fatigue of rigid oil-pressure line, propeller governer to crankcase.
E336	Mooney M-20E	4 Jun 79	0	S	Idar-Oberstein, W. Germany. Stud of #3 cylinder.
E384	Mooney M-20G	21 Mar 81	2	D	Ryegate, Mt. USA. Mufflers, poor weld, corrosion and fatigue fracture.
E387	Mooney M-20K	3 May 81	0	S	Churchville, Md. USA. No. 5 piston. Internal voids found near hole in sidewall.
E394	Mooney M-20K	25 Jul 81	0	S	Defuniak Springs, Fl. USA. No. 2 conrod.
E395	Mooney M-20F	30 Jul 81	0	S	Licking, Mo. USA. Crankcase.

Propeller

F26	Mooney M-20E	16 Feb 65	0	S	Woodward, Okla. USA. Propeller blade (sharp nick).
F34	Mooney M-20B	6 Feb 66	0	S	Bellview, N.Mex. USA. Propeller blade broke 15" from tip.
F47	Mooney M-20E	6 Mar 67	0	S	Pendleton, Ore. USA. 6" of propeller blade separated.

F48	Mooney M-20C	12 Mar 67	0	S	Mangum, Okla. USA. Propeller hub.
F51	Mooney M-20D	8 Apr 67	0	S	Erie, Colo. USA. Propeller hub.
F52	Mooney M-20E	15 May 67	0	S	Dighton, Kans. USA. Prop blade (4 1/2" from tip).
F62	Mooney M-20E	29 Oct 67	0	S	Fort McCoy, Fla. USA. Propeller blade (origin: corrosion pit).
F69	Mooney M-20C	24 Apr 68	0	D	Hillsboro, Kansas USA. 18 in. of propeller blade separated.
F72	Mooney M-20E	28 Jul 68	0	S	Jackson, La. USA. Propeller blade across shank.
F83	Mooney M-20B	16 Aug 69	0	D	Quitman, Ark. USA. Propeller blade.
F90	Mooney M-20E	3 Oct 70	0	S	Enterprise, Kans. USA. Blade failed 3" outboard of hub flange.
F91	Mooney M-20E	26 Oct 70	0	S	Chugwater, Wy. USA. Propeller blade, 3" from hub.
F128	Mooney M-20A	12 Nov 73	1	D	Innisfree, Alta. Canada. Propeller.
F133	Mooney M-20E	20 Jul 74	2	D	Custer, S. Dakota USA. Propeller blade at shot-peened area.
F138	Mooney M-20C	25 Aug 74	0	S	Stanfield, Ariz. USA. Propeller blade. Prior damage dressed out.
F162	Mooney M-20C	24 Jan 76	0	S	Fontana, Cal. USA. Propeller hub (blade socket retention threads).
F200	Mooney M-20C	6 Jun 78	0	S	Bennett, Col. USA. Propeller at indentation on edge of blade.
F223	Mooney M-20C	16 Oct 80	0	S	Willcox, Az. USA. 21" of blade shed (possible high stress from blade straightening).
	Landing Gear				
G63	Mooney M-20	12 Jun 64	0	S	Bucklin, Kans. USA. Landing gear handle.
G129	Mooney M-20A	23 Sep 65	0	S	West Carrollton, Ohio. USA. Tubular spacer between nose gear actuator rod bellcrank and gear retraction rod bellcrank.
G138	Mooney M-20E	1 Nov 65	0	S	Shreveport, La. USA. Nose gear shock absorber.

G145	Mooney M-20C	28 Nov 65	0	S	Denver, Colo. USA. Nose gear retract truss assembly.
G153	Mooney M-20A	2 Jan 66	0	S	Goodland, Kans. USA. Weld on spacers of clevis fittings on lateral torque rod failed.
G166	Mooney M-20	16 Apr 66	0	S	Kingman, Kans. USA. Nose gear struts (welds).
G203	Mooney M-20	21 Mar 67	0	S	Minden, Nev. USA. Landing gear lever bell cranks in attach welds.
G528	Mooney M-20F Executive 21	2 May 81	0	S	Hamilton, Ont. Canada. Nose gear steering shaft.

MOONEY M-21

	Propeller				
F18	Mooney Mk21	7 Jul 64	0	S	Mansfield, Mo. USA. Propeller blade.
F19	Mooney M-21	6 Sep 64	0	S	Calpine, Cal. USA. Propeller blade.
	Landing Gear				
G303	Mooney M-21	14 Feb 71	0	S	North Shore, Cal. USA. Actuating lever (weld) P/N 5059.

MOROVAN ZLIN 326/Z526

	Wing				
A96	Zlin Z526A	3 Jun 70	0	D	UK. Failure of centre-section, lower spar boom, left wing inboard of undercarriage leg. Aircraft crash-landed successfully. Airframe hours: 453, mainly in aerobatics.
	Engine				
E292	Moravan Z526	2 Sep 77	0	S	Schmidgaden, W. Germany. Intake valve, #2 cylinder.
	Miscellaneous				
H3	Zlin 326	1 May 63	1	D	Oulu Airport, Finland. During towing, sailplane's cylinder cap broke and pilot interrupted towing. While turning back to airport, aircraft crashed.

MORRISEY 2150 (See Varga 2150 Kachina)

MUSTANG L-2

	Propeller				
F103	Mustang L-2	12 Sep 71	1	S	Indio, Calif. USA Propeller unapproved for engine installation, blade separated.

NAVION

	Engine				
E41	Navion B	27 Jan 65	0	S	Flushing, N.Y. USA. No. 4 bearing cap bolt.

E43	Navion B	7 Mar 65	0	S	Englewood, Fla. USA. Heater muffler at exhaust stack attachment.
E46	Navion A	1 Apr 65	0	D	Coon Rapids, Minn. USA. No. 1 piston.
E88	Navion A	8 Sep 66	0	S	Phillipstown, N.Y. USA. Crankshaft accessory drive gear dowel pin and attach screws failed.
E95	Navion B	18 Jun 67	0	S	Stoney Plain, Alta. Canada. Studs attaching stationary gear drive plate to interior of reduction gear housing.
	Landing Gear				
G66	Navion G	1 Jul 64	0	S	Des Moines, Iowa. USA. Nose wheel steering torque tube.
G183	Navion B	12 Aug 66	0	S	Bakersfield, Cal. USA. Nose gear trunnion unit (weld).

NOORDUYN NORSEMAN

	Wing				
A56	Noorduyn Norseman V	15 Sep 58	1	D	Nanika, Ont. Canada. Wing failure. Rear front eyebolt, attaching diagonal wing strut to front spar of right wing
A67	Noorduyn Norseman V seaplane	22 Jan 63	1	D	Pickle Lake, Ont. Canada. Left wing failure. Upper forward strut eyebolt.
	Landing Gear				
G34	Norseman IV	28 Feb 62	0	S	Mellersh Pt., B.C. Canada. Fitting socket of right float strut attachment.
G105	Norseman V	26 Feb 65	0	S	Big Trout Lake, Ont. Canada. Left gear axle housing at lower end of shock strut.
G168	Norseman 6	23 Apr 66	0	S	Bowden Lake, Man. Canada. Right gear shock strut stub leg (cracks in weld repair).

NORTH AMERICAN AT-6 TEXAN/HARVARD

	Flight Controls				
D10	N. American SNJ-5 Texan	14 Aug 65	0	S	Monroeville, Pa. USA. Left rudder cable.
	Engine				
E152	North American AT-6G	27 Sep 71	2	D	Davis Creek, Calif. USA. Fracture in heater shroud allowed engine exhaust to enter cockpit.

NORTH AMERICAN B-24 LIBERATOR

Landing Gear

G4	N. American B-24 Liberator (USAAC)	1944	?	?	? Nose gear failure.

NORTH AMERICAN P-51 MUSTANG

Wing

A41	N. American F-51 Mustang (USAF)	1953-59	?	?	? Wing failure.

Tail

B6	N. American F-51 Mustang (USAF)	1953-59	?	?	? Tail failure.

Engine

E301	N. American P-51 Mustang	15 Feb 78	0	S	Ellisville, Ms. USA. Crankshaft at no. 4 webbing.

Landing Gear

G139	N. American P-51D Mustang	4 Nov 65	0	S	Santa Monica, Cal. USA. Tailwheel turnbuckle shaft.

Engine Mounts

H1	N. American P-51 Mustang (USAF)	Mar 44	1	D	Boxted, Essex. UK. Engine mounting bolts. Engine separated. (Faulty heat treatment).

NORTH AMERICAN F-86 SABRE (FJ FURY)

Wing

A44	N. American F-86F Sabre (USAF)	Nov 54	?	D	Nellis Air Force Base, Nevada USA. Wing failure at under-wing aluminum attach bars
A45	N. American F-86H Sabre (USAF)	Nov 54	?	D	Nellis Air Force Base, Nevada USA. Wing failure at under-wing aluminum attach bars
A46	N. American FJ-4 Fury (US Navy)	1955-59	1	D	? Wing failure (bolt holes). Role changed from fighter to fighter-bomber.

Fuselage

C5	N. American F-86 Sabre (USAF)	1953-59	?	?	? Fuselage failure.

Miscellaneous

H15	N. American F-86 Sabre (RAAF)	3 Jan 68	1	?	Ubon, Thailand. Bolt in engine intake fatigued. Bolt head ingested by engine, causing aircraft to stall on final approach.

NORTH AMERICAN F-100 SUPER SABRE

Wing

A84	N. American F-100 Super Sabre (USAF)	1967 or 68	1?	D	Nellis AFB, USA. Wing failure at Wing Canted Station 102, lower skin 51% spar bolt holes. Matl: 7075-T651. 2140 airframe hours.
A86	N. American F-100D Super Sabre (USAF)	21 Oct 68	0	D	Laughlin AFB, Del Rio, Texas USA. Wing failure at Wing Centre Section, lower-cover outer-skin bolt hole. Matl: 7075-T6. 2890 airframe hr. Role: Thunderbirds demo team.

NORTH AMERICAN SABRELINER

Landing Gear

G334	N. American Sabreliner 40	28 Aug 72	0	S	Columbia, Mo. USA. Right gear outer cylinder.

NORTH AMERICAN ROCKWELL COMMANDER (See Aero Commander)

NORTHRUP F-5

Wing

A95	Northrup F-5A (USAF)	20 Apr 70	1	D	Williams AFB, USA. Wing separation. Centre wing lower skin. Tool damage caused initial crack.

Engine

E260	Northrup CF-5 (Canadian Forces)	2 May 76	0	D	Winnipeg, Man. Canada. #1 afterburner spray bar cracked. Torching burned through heat shield causing fire.

NORTHRUP F-89 SCORPION

Wing

A36	Northrup F-89C Scorpion (USAF)	1952	?	D	? Wing failure, wing-fuselage fitting.
A37	Northrup F-89 Scorpion (USAF)	Sep 52	2	D	Detroit, USA. Right wing failure, wing-fuselage fitting.

OWL RACER

Propeller

F97	Owl Racer	31 May 71	1	D	Greenwich Reach, England. Half a prop blade shed, tearing out engine. Origin: corrosion pit.

PIAGGIO P.149

Engine

E228	Piaggio P.149-D1	13 Apr 75	0	S	Neuenwalde, W. Germany. Crankshaft. Vibration due to wear of bearings.

PIAGGIO P.166

Engine

E275	Piaggio P.166	1977	1	?	Australia. Engine connecting rod.

PIETENPOL AIRCAMPER

	Flight Controls				
D37	Pietenpol B4 Aircamper	8 Jul 79	1	D	Mesa, Arizona USA. Elevator push-pull bell-crank mounting steel tube.

PIPER J-3 CUB

	Wing				
A26	Piper Cub J-3	26 May 47	2	D	Ft. Lauderdale, Fla. USA. Wing failure at shoulder machined on threaded insert, inner end of left front, lower lift-strut fitting.
A126	Piper J-3C	27 Aug 79	0	D	Aurburndale, Florida USA. Right wing failed. Rear inboard strut clevis.
	Engine				
E73	Piper J-3C	25 Jan 66	0	S	Chesapeake, Va. USA. No. 2 cylinder exhaust valve.
	Propeller				
F92	Piper J-3	6 Feb 71	0	S	Portage La Prairie, Man. Canada. Propeller.
	Landing Gear				
G136	Piper J-3C	24 Oct 65	0	S	Lake Thonotosas, Fla. USA. Right float (vertical strut ball fitting).
G164	Piper J-3C	2 Apr 66	0	S	Vicksburg, Miss. USA. Right main gear strut.
G506	Piper J-3 Cub	13 Jun 80	0	S	Celt Lake, Ont. Canada. Left float attachment at necked portion of bolt attachment at strut end. 1646 airframe hrs
	Rudder Pedal				
H7	Piper J-3C	4 Jul 64	0	D	Houston, Texas USA. Right brake pedal attaching lugs.

PIPER J-4 CUB COUPE

	Wing				
A101	Piper J-4A	4 Dec 71	0	D	Boise, Idaho USA. Failure of left wing. Lift strut, fuselage attach clevis broke. Previous landing incident.
	Engine				
E103	Piper J-4	5 May 68	0	S	Berlin, N.J. USA. Crankshaft failed in keyway.

PIPER PA-12 SUPER CRUISER

	Tail				
B32	Piper PA-12 Super Cruiser	4 May 78	0	S	Rheine-Eschendorf, W. Germany. Horizontal stabilizer, front spar attachment.
	Landing Gear				
G426	Piper PA-12 Super Cruiser	18 Mar 76	0	S	Elliot Lake, Ont. Canada. Shock cord attachment bolt (left ski).
G430	Piper PA-12 Super Cruiser	5 Jun 76	0	S	Arthur, Ont. Canada. Left undercarriage (fatigue and corrosion)

PIPER PA-16 CLIPPER

Landing Gear

G68	Piper PA-16 Clipper	17 Jul 64	0	S	Clear, Alas. USA. Left front landing gear attach fitting.

PIPER PA-18 SUPER CUB

Wing

A77	Piper PA-18 Super Cub	11 Jun 66	1	D	Moose Jaw, Sask. Canada. Right wing failure (rear strut fork end). Problem brought about by repeated heavy loadings imposed by crop spraying and rough field operations.

Flight Controls

D6	Piper PA-18 Super Cub	31 Jan 64	0	S	Lewiston, Id. USA. Rudder cable attachment fitting lug.

Engine

E49	Piper PA-18 Super Cub	24 Apr 65	1	D	Dell, Montana USA. Fracture in muffler obstructed exhaust gas flow. Back-pressure caused power failure.
E137	Piper PA-18 Super Cub	3 Oct 70	0	S	Loxley, Ala. USA. Carburetor cracked around back side of throat.
E339	Piper PA 18-150 Super Cub	23 Aug 79	0	S	Schwatka Lake, Y.T. Canada. Rear section of valve in carb heat box. Avco Lycoming O-320 engine.
E365	Piper PA-18 Super Cub	22 Aug 80	1	S	Exeter, R.I. USA. No. 3 exhaust valve failed. Annual inspection overdue.

Propeller

F148	Piper PA-18 Super Cub	31 May 75	0	S	Carp, Ont. Canada. Propeller blade tip shed (nick or pit on leading edge).
F205	Piper PA-18A Super Cub	7 Dec 78	0	S	Cooper Landing, Ak. USA. Propeller blade.

Landing Gear

G169	Piper PA-18 Super Cub	23 Apr 66	0	S	Tyonek, Alas. USA. Landing gear: ski assembly.
G182	Piper PA-18 Super Cub	4 Aug 66	0	S	Gakona, Alas. USA. Left axle shaft separated. Flown extensively from rough strips.
G315	Piper PA-18 Super Cub	20 Sep 71	0	S	Chitina, Alas. USA. Left axle.
G342	Piper PA 18-150 Super Cub	1973	0	S	Camden NSW, Australia. Main gear strut to fuselage attach fitting.
G369	Piper PA-18 Super Cub	3 Mar 74	0	S	Shungnak, Alas. USA. Crack in right gear.

G526	Piper PA-18 Super Cub	22 Apr 81	0	S	Fresno, Ca. USA. Main gear strut assembly rod, PN 12844-04.
G535	Piper PA-18-125 Super Cub	18 Aug 81	0	S	Burg Feuerstein, W. Germany. Main landing gear leg.

PIPER PA-20 PACER

	Wing				
A132	Piper PA-20 Pacer	26 Nov 80	3	D	East Berlin, Pa. USA. Right wing failure. Strut lower fork assembly, P/N 14481.
	Engine				
E364	Piper PA-20 Pacer	18 Aug 80	0	S	East Gore, N.S. Canada. Oil line fitting in oil cooler (corrosion pits in thread roots). Avco Lycoming O-290 engine.
	Landing Gear				
G374	Piper PA-20 Pacer	26 Apr 74	0	S	Waterloo, Iowa. USA. Tailwheel mounting bolt.

PIPER PA-22 COLT/TRI-PACER

	Wing				
A103	Piper PA-22	19 Jul 72	0	S	Eden Prairie, Minn. USA. Right wing lift strut fork. Precautionary landing made.
A121	Piper PA-22	18 Feb 78	2	D	Camden, Tenn. USA Right wing failed (strut attach bolt). Unapproved mod: probe attached to wing strut.
A129	Piper PA-22	2 Feb 80	2	D	Princeton, Ill. USA. Wing failure, right front lift-strut fork end, P/N 14481-00.
	Engine				
E40	Piper PA-22	31 Oct 64	0	D	Hanover, Ont. Canada. Crankshaft bearing failure caused fatigue crack in the crank throw.
E51	Piper PA-22	13 May 65	0	S	Jeffersonville, Ind. USA. Crankshaft flange.
E61	Piper PA-22	6 Sep 65	0	S	Clermont, Ind. USA. Muffler (baffle failed).
E69	Piper PA-22	1 Dec 65	0	D	Beaufort, S.C. USA. Exhaust muffler inlet pipe.
E76	Piper PA-22	24 Feb 66	0	S	Hamburg, N.Y. USA. Exhaust pipe cracked.
E104	Piper PA-22	23 Jun 68	0	S	Lac Baron, Que. Canada. Bolt of no. 2 connecting rod.
E109	Piper PA-22	29 Sep 68	0	S	Cumberland, Md. USA. Camshaft gear attach bolts.

E116	Piper PA-22	26 Apr 69	0	S	Chenango Bridge, N.Y. USA. No. 4 cylinder barrel.
E204	Piper PA-22	8 Mar 74	0	S	Compton, Cal. USA. Piston of no. 3 cylinder.
E234	Piper PA-22	18 Jun 75	0	S	Wyoming, Ont. Canada. No. 3 exhaust valve.
E334	Piper PA-22	25 Apr 79	0	S	King City, Cal. USA. No. 2 conrod, P/N 74502.
	Landing Gear				
G65	Piper PA-22	20 Jun 64	0	S	Satanta, Kans. USA. Left gear shock strut at weld.
G111	Piper PA-22	8 May 65	0	S	Paducah, Ky. USA. Nose gear support tubes.
G156	Piper PA-22	13 Feb 66	0	S	Flint, Mich. USA. Nose gear mount.
G174	Piper PA-22	18 Jun 66	0	S	Ronkonkoma, N.Y. USA. Main landing gear.
G209	Piper PA-22	20 May 67	0	S	Lexington, Mo. USA. Left landing gear forward and rear vee tubes.
G384	Piper PA-22	14 Sep 74	0	S	West Hickory, Pa. USA. Nosewheel assembly.
G419	Piper PA 22-160	1976	0	S	Chilchil Stn., Australia. Right gear leg weld at bungee carrier.
G467	Piper PA-22	12 Aug 78	0	S	Datil, N.M. USA. Left tube of nose gear mount.
G521	Piper PA-22	28 Feb 81	0	S	Knik Glacier, Ak. USA. Nosewheel assembly.
	Miscellaneous				
H11	Piper PA-22	5 Jul 65	0	S	Underwood, Wash. USA. Master brake cylinder diaphragm.
H35	Piper PA-22-108	13 Jan 80	0	S	Groblersdal, Republic of South Africa. Brake pressure pipe at master cylinder. Origin: belling of pipe.

PIPER PA-23 AZTEC

	Tail				
B29	Piper PA-23 Aztec	27 Sep 77	0	S	Morris, Ill. USA. Rudder attachment. Sequin Aviation rudder STC SA671SW failed.
	Engine				
E139	Piper PA-23 Aztec	30 Nov 70	0	S	Doylestown, Pa. USA. Engine controls mount bracket assembly failed at pedestal.

Propeller

F49	Piper PA-23 Aztec	27 Mar 67	0	S	Granville, N.Y. USA. Right propeller attach studs.
F173	Piper PA-23 Aztec	16 Aug 76	0	S	Miami, Fla. USA. Propeller separated.
F175	Piper PA-23 Aztec	15 Sep 76	0	D	Independence, Mo. USA. 3 propeller mounting studs.
F217	Piper PA 23-250 Aztec	4 Feb 80	0	S	Williams Lake, B.C. Canada. Propeller hub spider arm. (lack of grease).

Prop Governor Oil Line

H32	Piper PA-23 Aztec	18 Jan 79	3	D	Scottown, Ohio USA. Left engine propeller governor oil line failed. Wrong part. Aluminum tube used, and manufacturer specified steel.

Landing Gear

G97	Piper PA-23 Aztec	13 Jan 65	0	S	Wilkesboro, N.C. USA. Lower nose wheel drag link.
G118	Piper PA-23 Aztec	13 Jul 65	0	S	Renesselaer, Ind. USA. Nose gear turning stop broken.
G158	Piper PA-23 Aztec	19 Feb 66	0	S	East St. Louis, Ill. USA. Nose gear retract strut.
G249	Piper PA-23 Aztec	5 Mar 69	0	S	Lake Wales, Fla. USA. Rear tube of drag brace assembly (nose wheel).
G251	Piper PA-23 Aztec	21 Mar 69	0	S	Jacksonville, Fla. USA. Nose gear upper drag link, P/N 19045-00.
G373	Piper PA-23 Aztec	16 Apr 74	0	S	Opa Locka, Fla. USA. Upper drag link, nose gear. P/N 19045.00
G420	Piper PA 23-250 Aztec	1976	0	S	Prosperine Qld., Australia. Right main gear drag link centre bolt (excessive wear).
G518	Piper PA-23 Aztec	1981	0	S	Wangi Stn, NT, Australia. Main gear drag link bolt.

PIPER PA-24 COMMANCHE

Wing

A133	Piper PA-24 Commanche	1981 or 82	?	?	? Failure of wing lower spar cap.

Engine

E66	Piper PA-24 Commanche	4 Nov 65	0	S	Homer, Ga. USA. No. 3 cylinder connecting rod cap bolts.
E67	Piper PA-24 Commanche	5 Nov 65	0	S	Red Bluff, Cal. USA. Generator brushes.

E71	Piper PA-24 Commanche	15 Jan 66	0	S	Montgomery, La. USA. No. 1 cylinder exhaust valve.
E205	Piper PA-24 Commanche	14 Mar 74	0	S	Highland Beach, Fla. USA. No. 2 conrod.
E253	Piper PA-24 Commanche	7 Jan 76	0	S	Santee, Cal. USA. Crankshaft dowel pin.
E372	Piper PA-24 Commanche	30 Nov 80	1	D	Annawan, Ill. USA. Crankshaft counterweight assembly P/N 71904 at machining groove.
E377	Piper PA-24 Commanche	10 Jan 81	0	S	Olympia, Wa. USA. Crankshaft. During re-nitriding, temps exceeded allowable, lowering core hardness.
	Propeller				
F231	Piper PA-24 Commanche	29 Aug 81	0	S	Sacramento, Ca. USA. Propeller blade.
	Landing Gear				
G70	Piper PA-24 Commanche	28 Aug 64	0	S	Los Angeles, Cal. USA. Nose gear drag link clevis bolt, P/N 20859-00.
G85	Piper PA-24 Commanche	24 Oct 64	0	S	Torrance, Cal. USA. Nose gear drag link clevis broke (threads)
G94	Piper PA-24 Commanche	10 Dec 64	0	S	Philadelphia, Pa. USA. Nose gear drag link clevis (threads). P/N 20859-03.
G173	Piper PA-24 Commanche	26 May 66	0	S	Salem, Ore. USA. Nose gear push-pull rod (thread at inboard end). P/N 211-09-00.

PIPER PA-25 PAWNEE

	Wing				
A83	Piper PA-25 Pawnee	11 Aug 67	1	D	Coweta, Okla. USA. Right wing failure. Spar lugs, wing attach fitting, improper weld. Role: aerial application.
A108	Piper PA-25 Pawnee	24 Aug 73	0	D	Rayville, La. USA. Wing separation. Fracture of spar. Role: aerial application.
A109	Piper PA-25 Pawnee	1 Oct 73	0	D	Rohwer, Ark. USA. Right wing separated. Rear mount bracket and front spar broken at mount bracket. Role: aerial application.
A111	Piper PA-25 Pawnee	18 Oct 73	1	D	Slaton, Texas, USA. Wing failure (spar). Initiation at improperly-drilled rivet hole. Role: aerial application.

A131	Piper PA-25 Pawnee	2 Aug 80	1	D	Dumas, Texas USA. Left wing failed (spar) where lower flange was mis-drilled. Role: crop spraying.
	Fuselage				
C16	Piper PA-25 Pawnee	20 Aug 65	0	S	Newellton, La. USA. Both upper fuselage longerons failed (poor weld).
	Flight Controls				
D9	Piper PA-25 Pawnee	2 Jun 65	1	D	Clarendon, Ark. USA. Fracture in elevator tab control system. Role: aerial application.
D40	Piper PA-25 Pawnee	1980	0	D	Sassafras, Tas. Australia. Up-elevator cable rear turnbuckle failed. Non-corrosive-resistant bolt fitted & overtightened.
	Engine				
E105	Piper PA-25 Pawnee	5 Jul 68	0	S	Bosco, La. USA. Left magneto shaft.
E106	Piper PA-25 Pawnee	25 Aug 68	0	S	David City, Neb. USA. Mixture control wire failed in bend radius.
E141	Piper PA 25-235 Pawnee	1971	0	D	Moura, Queensland Australia. Fatigue of mixture control part. (Not genuine part.)
E181	Piper PA 25-235 Pawnee	1973	0	S	Trentham Vic., Australia. Part impulse coupling cam fell between crankshaft idler gear.
E193	Piper PA-25 Pawnee	22 Jun 73	0	S	Gettysburg, S. Dak. USA. Crankshaft.
E245	Piper PA-25 Pawnee	6 Sep 75	0	S	Tahoka, Tex. USA. Crankshaft.
	Propeller				
F73	Piper PA-25 Pawnee	7 Sep 68	0	S	St. Joseph, La. USA. Propeller at station 29.
	Landing Gear				
G57	Piper PA-25 Pawnee	28 Apr 64	0	S	Terrell, Tex. USA. Main gear shock strut at lower end weld.
G84	Piper PA-25 Pawnee	22 Oct 64	0	S	Elmira, Cal. USA. Both landing gear shock struts at lower attach fittings. AD not complied with.
G268	Piper PA 25-150 Pawnee	1970	0	S	Marlborough Qld., Australia. Undercarriage V-brace.
G320	Piper PA 25-150 Pawnee	1972	0	S	Kingaroy Qld., Australia. Left main undercarriage brace tube.

G364	Piper PA 25-235 Pawnee	1973	0	S	Griffith NSW, Australia. Undercarriage main gear shock absorbing system. Misalignment of pivot bolt in spigot hole during aircraft rebuild. Sharp edge pivot hole/spigot.
G366	Piper PA 25-235 Pawnee	1974	0	S	Oberon NSW, Australia. Left gear front attachment (poor weld).
G377	Piper PA-25 Pawnee	10 May 74	0	S	Loxahatchee, Fla. USA. Right main gear shock strut P/N 64502-03.
G408	Piper PA-25-260	4 Oct 75	0	S	Varkaus, Finland. Landing gear fastening bracket.

PIPER PA-28 CHEROKEE

Engine

E100	Piper PA-28 Cherokee	14 Jan 68	0	S	Hazelhurst, Ga. USA. No. 2 connecting rod.
E148	Piper PA-28R Cherokee	17 Jun 71	0	S	Garnett, Kans. USA. Crankshaft (front portion of # 3 main journal).
E155	Piper PA-28R Cherokee	26 Oct 71	0	S	La Porte, Tex. USA. # 4 conrod cap.
E182	Piper PA 28-140 Cherokee	1973	0	S	Moorabbin Vic., Australia. No. 2 connecting rod.
E197	Piper PA-28-180 Cherokee	19 Aug 73	0	D	Helsinki, Finland. Forward end bearing of crankshaft broke (fatigue), due to an inside corrosion.
E267	Piper PA-28-140 Cherokee	10 Aug 76	2	?	Helsinki, Finland. Exhaust valve of Lycombing O-320-E3D engine.
E278	Piper PA-28 Cherokee	12 May 77	0	S	Iowa City, Iowa. USA. Engine cylinder assembly.
E288	Piper PA-28R Cherokee	20 Aug 77	0	S	Los Angeles, Cal. USA. Conrod bolts.
E312	Piper PA-28 Cherokee	16 Jul 78	0	S	Saitama Pref., Japan. #2 cylinder exhaust push rod.
E313	Piper PA-28 Cherokee Cruiser	19 Jul 78	0	S	Causapscal, Que. Canada. Avco Lycoming O-360 engine. #3 cylinder. Aircraft had flown only 17 hours in 12 years.
E350	Piper PA-28R Cherokee	12 Feb 80	0	S	Sherman, Il. USA. Crankshaft.
E357	Piper PA-28 Cherokee Cruiser	9 May 80	3	D	Desboro, Ont. Canada No. 3 cylinder, piston & rod assembly separated from engine. Fracture of all 8 cylinder studs (improper torquing of studs)

E388	Piper PA-28 Cherokee Cruiser	5 Jun 81	0	S	Stony Rapids, Sask. Canada. Exhaust valve at stem-to-head fillet. Origin: corrosion pits.
E392	Piper PA-28 Cherokee	19 Jul 81	1	D	Buckland, NC. USA. No. 3 cylinder exhaust valve (guide worn).
	Propeller				
F21	Piper PA-28 Cherokee	9 Dec 64	0	S	Burbank, Cal. USA. Propeller blade.
F33	Piper PA-28 Cherokee	11 Jan 66	0	S	Fayetteville, Ark. USA. Propeller blade.
F38	Piper PA-28 Cherokee	10 Jul 66	0	S	Flushing, N.Y. USA. Propeller blade. (Origin: small pit on surface).
F39	Piper PA-28 Cherokee	23 Jul 66	0	S	Columbia City, Ind. USA. Propeller blade failed across the mid-blade decal, required corrosion inspection not done.
F80	Piper PA-28 Cherokee	10 Aug 69	1	D	Los Angeles, Calif. USA. 16 in. of one propeller blade broke off.
F93	Piper PA-28 Cherokee	11 Apr 71	0	S	Elmira, Cal. USA. No. 1 blade, 19" from tip. AD not complied with
F99	Piper PA-28R Cherokee	30 Jun 71	0	S	Carrollton, Ky. USA. Prop blade 4" from tip.
F119	Piper PA 28-180 Cherokee	1973	0	S	Warwick Qld. Australia. 6 inches of prop blade shed (stone damage).
F152	Piper PA-28 Cherokee	6 Jul 75	0	S	Weston, W.V. USA. Lost 22" of blade. AD not complied with.
F167	Piper PA-28R Cherokee	22 Feb 76	0	S	Little Rock, Ark. USA. 6 prop bolts failed.
F180	Piper PA-28R Cherokee	9 Mar 77	0	S	Petal, Miss. USA. Hartzell 7666 propeller blade.
F190	Piper PA 28-180 Cherokee	1978	0	S	Glen Innes, NSW, Australia. Prop blade.
F196	Piper PA 28R-180 Cherokee	5 May 78	0	S	Ehime Pref., Japan. Oil line tube assembly of propeller governor (stress concentration).
F197	Piper PA-28 Cherokee	8 May 78	0	S	Royalton, N.Y. USA. Propeller blade.
F206	Piper PA-28 Cherokee	22 Dec 78	4	D	Kennett, Mo. USA. Propeller separated.

F213	Piper PA-28 Cherokee Cruiser	16 Aug 79	2	D	Wildwood, Alta. Canada. 5 inches of propeller blade separated. Crack in blade previously repaired by removal of material, but incipient crack remained. 1528 airframe hours

Landing Gear

G122	Piper PA-28 Cherokee	18 Aug 65	0	S	Culver, Ind. USA. Nose gear strut.
G196	Piper PA-28 Cherokee	16 Jan 67	0	S	Pasadena, Md. USA. Nose wheel strut mount, adjacent to weld.
G238	Piper PA-28 Cherokee	22 Sep 68	0	S	Canandaigua, N.Y. USA. Nose gear shock strut piston.
G323	Piper PA-28-140 Cherokee	1 May 72	0	S	St. Hubert, Que. Canada. Right gear lower torque link (scissor). AD not complied with.
G325	Piper PA-28-140B Cherokee	12 May 72	0	S	St. Hubert, Que. Canada. Right gear upper torque link (AD not complied with).
G368	Piper PA-28 Cherokee	14 Feb 74	0	S	Sanford, Fla. USA. Two lugs on main-gear cylinder P/N 65319-03.
G433	Piper PA-28 Cherokee	9 Jul 76	0	S	Big Bear City, Cal. USA. Main gear, upper scissors gear strut lugs.
G440	Piper PA-28-140 Cherokee	1977	0	S	Bankstown, NSW Australia. Left main gear torque link (lower shackle bolt)
G442	Piper PA-28-140 Cherokee	1977	0	S	Murray Bridge, S.A. Australia. Torque link bolt in main undercarriage.
G527	Piper PA-28 Cherokee Cruiser	28 Apr 81	0	S	Sept Iles, Que. Canada. Right main gear torque links, AD not complied with.

PIPER PA-30 TWIN COMMANCHE

Engine

E219	Piper PA-30 Twin Commanche	2 Oct 74	0	S	Leavenworth, Kans. USA. Crankshaft.

Propeller

F86	Piper PA-30-160 Twin Commanche	24 Nov 69	1	D	Dandaloo, N.S.W. Australia. Most of propeller blade separated. Origin: corrosion in balancing cavity.
F101	Piper PA-30 Twin Commanche	6 Aug 71	0	S	Bloomington, Ill. USA. Left prop blade near hub.

Landing Gear

G189	Piper PA-30 Twin Commanche	14 Sep 66	0	S	Louisville, Ky. USA. Ball joint end of landing gear actuating conduit pin 455180 (outboard end of threads).

PIPER PA-31 NAVAJO/CHEYENNE

Engine

E352	Piper PA-31T Cheyenne	12 Mar 80	0	S	Kettleman City, Ca. USA. 2 compressor turbine vanes eroded and 3 blades fractured.
E389	Piper PA-31P Pressurised Navajo	8 Jun 81	0	S	Dallas, Tx. USA. Left engine lower tailpipe bracket failed. No inspection as per AD.

Propeller

F126	Piper PA-31 Navajo	25 Sep 73	0	S	Roswell, N. Mex. USA. 1 foot of right prop blade shed.
F208	Piper PA-31 Navajo	26 Jan 79	0	S	Lima, N.Y. USA. Right propeller blade tip. Hartzell HCE-24R-2CT

Landing Gear

G418	Piper PA 31-310 Navajo	1976	0	S	Moorabbin Vic., Australia. Hinge on right gear door.
G503	Piper PA 31-310 Navajo	30 Apr 80	0	S	St. Hubert, Que. Canada. Front hinge of right inboard gear door. Origin: coarse grinding of forging flash on inner radius.

PIPER PA-32 CHEROKEE SIX

Tail

B34	Piper PA-32 Cherokee SIX	1979	2	D	Marulan, NSW Australia. Right-hand stabilator failed.

Engine

E124	Piper PA-32 Cherokee SIX	12 Apr 70	0	D	Belle, Mo. USA. Foreign piece of metal enmeshed in crankshaft idler gear, causing gear failure.
E210	Piper PA-32 Cherokee SIX	4 Jun 74	0	S	Friendship, Wis. USA. Oil filter center stud P/N 5579427.
E221	Piper PA-32 Cherokee SIX	23 Oct 74	1	D	Huntsville, Texas USA. No. 3 cylinder separated. Holddown studs under-torqued, through bolts failed.
E255	Piper PA-32 Cherokee SIX	12 Jan 76	0	S	Big Spring, Tex. USA. Crankshaft.
E293	Piper PA-32 Cherokee SIX	9 Sep 77	0	S	Verden-Sch., W. Germany. Locking bolt on DC generator/alternator.
E308	Piper PA-32 Cherokee SIX	23 Jun 78	0	S	Goshen, Ind. USA. # 4 cylinder.
E398	Piper PA-32 Cherokee SIX	23 Sep 81	0	S	Cranbrook, B.C. Canada. Crankshaft web.

E402	Piper PA-32 Cherokee SIX	24 Nov 81	0	S	Woodland, Ca. USA. Crack in no. 5 cylinder from spark plug hole to cooling fins.

Propeller

F132	Piper PA-32 Cherokee SIX	29 Mar 74	0	S	Minto, Alas. USA. Propeller (pitch change dowel).
F158	Piper PA-32 Cherokee SIX	14 Oct 75	0	D	South Boston, Va. USA. Propeller blade pitch-change dowel failed, causing propeller failure.
F224	Piper PA-32 Cherokee SIX	1 Nov 80	0	S	Carlsbad, N.M. USA. 8 inches of propeller shed. Origin: nick.

Landing Gear

G314	Piper PA-32 Cherokee SIX	15 Sep 71	0	S	Boonville, Mo. USA. Axle of right gear (tool mark at base of axle centre bore).
G390	Piper PA 32-260 Cherokee SIX	1975	0	S	Iffley Stn. Qld, Australia. Left gear torque link bolt.

PIPER PA-34 SENECA

Engine

E279	Piper PA-34 Seneca	26 May 77	1	D	Bridgeport, WV, USA. Crankshaft (no. 3 main bearing journal).

Landing Gear

G534	Piper PA-34 Seneca	10 Aug 81	0	S	Wenatchee, Wa. USA. Main landing gear.

PIPER PA-36 PAWNEE BRAVE

Engine

E214	Piper PA-36 Pawnee Brave	2 Aug 74	0	S	Winnemucca, Nev. USA. Crankshaft.
E277	Piper PA-36 Pawnee Brave	20 Apr 77	0	S	Brawley, Cal. USA. No. 4 exhaust valve (thermal fatigue).

Landing Gear

G523	Piper PA 36-375 Pawnee Brave	14 Mar 81	0	S	Geraldine, New Zealand. Left gear leg. Radius outboard of fuselage. Time on part: 1487 hrs. Matl: AISA 6150 steel.
G531	Piper PA 36-375 Pawnee Brave	29 Jun 81	0	S	Whana Whana, New Zealand. Left gear leg at radius outboard of fuselage. 1085 hours on part. Matl: UNS H61500 spring steel.

PIPER PA-38 TOMAHAWK

Engine

E371	Piper PA-38 Tomahawk	17 Nov 80	2	D	Santa Rosa, Calif. USA. Pushrod of #4 intake valve flared. Thermal fatigue of valve.

Landing Gear

G536	Piper PA-38-112 Tomahawk	17 Sep 81	0	S	Ardmore, New Zealand. Front clamping bolt, left gear leg. Airframe hours: 700.

PITTS SPECIAL

Tail

B22	Pitts S-2A Special	3 Aug 72	0	S	Miami, Fla. USA. Forward attach tube of right horizontal stabilizer. Role: aerobatics.

Flight Controls

D43	Pitts S-1S	4 May 80	1	D	Fort Wayne, In. USA. Elevator push-pull tube at rod end bearing (lack of lubrication).

Propeller

F71	Pitts Special	21 Jul 68	1	D	Arco, Id. USA. Propeller blade separated 18 in. from tip.

PZL-102 KOS

Flight Controls

D5	PZL-102 Kos	13 May 62	2	D	Joensuu Airport, Finland. Supporting bracket of pedal.

R.F.C. SKYRIDER (ULTRALIGHT)

Miscellaneous

H37	R.F.C. Skyrider 20 (ultralight)	4 Jul 82	2	D	Clappisons Corners, Ont. Canada. Propeller driveshaft rear bearing lower housing

REPUBLIC SEABEE

Engine

E98	Republic RC-3 Seabee	20 Oct 67	0	S	Goleta, Cal. USA. Mixture control cable bracket.
E229	Republic RC-3 Seabee	13 Apr 75	2	D	Markham, Ont. Canada. No. 6 cylinder.

REPUBLIC F-84 THUNDERSTREAK

Wing

A38	Republic F-84 Thunderstreak (USAF)	1953	?	?	? Wing failure.

Fuselage

C4	Republic F-84 Thunderstreak (USAF)	1953-59	?	?	? Fuselage failure.

REPUBLIC F-105 THUNDERCHIEF

Fuselage

C13	Republic F-105B Thunderchief (USAF)	9 May 64	1	D	Hamilton Air Force Base, USA. Aircraft broke in two. Fuselage failure at tank cover, FS 350. Role: Thunderbird demonstration team. Airframe hours: 600. Material: 7075-T6.
C15	Republic F-105D-4 Thunderchief (USAF)	Jun 65	1?	D	USA? Fuselage failure at splice at fuselage tank cover, FS 350. Material: 7075-T6.

RLU BREEZY

Flight Controls

D39	RLU Breezy RLU-1	22 Sep 79	2	D	Frazer, Mi., USA. Fracture of lower weld in aileron cable pulley bracket. (Weld surface heavily oxidized.)

ROBIN/CENTRE EST DR 253 REGENT

Engine

E314	Centre Est DR 253	29 Jul 78	0	S	Leer-Nuettermoor, W. Germany. Exhaust valve.

ROBIN/CENTRE EST DR 400

Muffler

E257	Centre Est DR 400	29 Feb 76	0	D	Gelnhausen, W. Germany. Fatigue failure of non-approved muffler.

Engine Mount

H36	Robin DR 400	28 Jun 81	0	S	Bad Neuenahr, W. Germany. Engine mount.

ROCKWELL COMMANDER (See Aero Commander)

ROCKWELL OV-10 BRONCO

Landing Gear

G493	Rockwell OV-10A Bronco (USAF)	1980	?	?	USA? Nose gear fork at fillet radius just aft of jack point. Matl: 7075-T73 forging.

RYAN PT-22

Engine

E348	Ryan PT-22	5 Feb 80	0	S	Oakland, Ca. USA. Crankshaft.

S.A.N. JODEL

Engine

E138	Jodel F-11	17 Oct 70	0	S	Vernon, Ont. Canada. Crankshaft (improper reconditioning).
E198	S.A.N. Jodel D.117	3 Sep 73	3	D	Brixham, U.K. No. 2 cylinder at head attachment thread.

Landing Gear

G519	Jodel D11	1981	0	S	Camden NSW, Australia. Upper section of strut, left gear (weld).

SAAB-SCANIA 32 LANSEN

Engine

E135	Saab-Scania A32A Lansen (Swedish AF)	13 Aug 70	0	D	Oxelosund, Sweden. Fuel pipe.
E166	Saab-Scania S32C Lansen (Swedish AF)	12 Apr 72	0	D	Ostersund, Sweden. Fuel pipe.

E246	Saab-Scania A32A Lansen (Swedish AF)	9 Sep 75	0	D	Strangnas, Sweden. Turbine disc.
E248	Saab-Scania A32A Lansen (Swedish AF)	17 Nov 75	0	S	Vanersborg, Sweden. Compressor disc.

SAAB-SCANIA 35 DRAKEN

Engine

E93	Saab-Scania S35E Draken (Swedish AF)	10 May 67	0	D	Soderkoping, Sweden. Compressor blade.
E127	Saab-Scania S35E Draken (Swedish AF)	3 Jun 70	0	D	Aalborg, Denmark. Compressor blade.
E136	Saab-Scania S35E Draken (Swedish AF)	16 Sep 70	0	D	Arvidsjaur, Sweden. Compressor blade.
E185	Saab-Scania J35F Draken (Swedish AF)	10 Jan 73	0	D	Vasteras, Sweden. Compressor blade.
E232	Saab-Scania S35E Draken (Swedish AF)	5 Jun 75	0	D	Lulea, Sweden. Compressor blade.
E298	Saab-Scania J35F Draken (Swedish AF)	23 Nov 77	0	D	Angelholm, Sweden. Turbine disc.
E310	Saab-Scania J35F Draken (Swedish AF)	30 Jun 78	0	D	Vasteras, Sweden. Turbine disc.
E328	Saab-Scania J35F Draken (Swedish AF)	6 Feb 79	0	D	Vastervik, Sweden. Turbine screw.
E341	Saab-Scania S35E Draken (Swedish AF)	30 Aug 79	0	D	Katrineholm, Sweden. Turbine disc.

Miscellaneous

H27	Saab-Scania S35E Draken (Swedish AF)	6 Apr 77	0	D	Nykoping, Sweden. Support profile in engine exhaust.

SAAB SCANIA AJ37 VIGGEN

Wing

A113	Saab-Scania AJ37 Viggen (Swedish AF)	11 Jul 74	0	D	Just south of Lake Vanern, Sweden. Port wing failure. Main spar, close to root.

A115	Saab-Scania AJ37 Viggen (Swedish AF)	6 Oct 75	0	D	Lake Vanern, Sweden. Port wing failure. Main spar, close to root.
A116	Saab-Scania AJ37 Viggen (Swedish AF)	10 Oct 75	0	D	Baltic Sea near Sweden. Right wing failure. Main spar, close to root.
	Engine				
E200	Saab-Scania AJ37 Viggen (Swedish AF)	9 Oct 73	0	D	Linkoping, Sweden. Compressor disc.
E244	Saab-Scania Viggen (test aircraft)	27 Aug 75	0	D	Karlsborg, Sweden. Compressor blade.
E294	Saab-Scania AJ37 Viggen (Swedish AF)	22 Sep 77	0	D	Lidkoping, Sweden. Failure of ball retainer in drive-shaft ball-bearing.
E379	Saab-Scania AJ37 Viggen (Swedish AF)	10 Feb 81	0	D	Karlsborg, Sweden. Shaft failure in engine gear-box due to ball-bearing failure.
E397	Saab-Scania SF37 Viggen (Swedish AF)	29 Aug 81	0	D	Lulea, Sweden. Fuel pipe.
	Miscellaneous				
H22	Saab-Scania SK37 Viggen (Swedish AF)	15 Nov 76	0	D	Edsbyn, Sweden. Attachment of engine front cowl.
H25	Saab-Scania SH37 Viggen (Swedish AF)	10 Mar 77	0	D	Vastervik, Sweden. Heat shield in engine.

SCHEIBE BERGFALKE III (SAILPLANE)

	Miscellaneous				
H29	Scheibe Bergfalke-III	9 Aug 77	0	S	Unterwoessen, W. Germany. Clutch support structure strut assembly.

SCHEIBE SF-26 STANDARD (SAILPLANE)

	Flight Controls				
D27	Scheibe SF-26A sailplane	25 May 75	0	D	Perris, Ca. USA. Right aileron bellcrank failed in flight. Pilot bailed out.

SCHEIBE ZUGVOGEL (SAILPLANE)

	Flight Controls				
D35	Scheibe Zugvogel III-B	10 Sep 78	0	S	Kreuzberg-Kronach, W. Germany. Right spoiler drive.

SCHLEICHER K 8 (SAILPLANE)

Flight Controls

D33	Schleicher K 8	10 Jul 77	0	D	Guetersloh, W. Germany. Elevator control rod.

SCHWEIZER TSC-1A

Landing Gear

G381	Schweizer TSC-1A	9 Aug 74	0	S	Kissimmee, Fla. USA. Landing gear strut.

SCOTTISH AVIATION TWIN PIONEER

Wing

A50	Scottish Aviation Twin Pioneer	30 Aug 57	3	D	Off Jahen Island, New Guinea. Separation of right wing. Failure of V-brace strut.
A52	Scottish Aviation Twin Pioneer	7 Dec 57	6	D	Fezzan, Libya. Failure in forward tube of V-brace strut, port wing. Outer wing panel separated. Material: 4T2 steel. Airframe hours: 564.

SIAI-MARCHETTI S.205

Landing Gear

G463	SIAI-Marchetti 205-20/R	11 Jun 78	0	S	Straubing, W. Germany. Left main gear actuator rod (thread).

SIAI-MARCHETTI SF.260

Engine

E382	SIAI-Marchetti SF.260M (Belgian AF)	13 Mar 81	0	D	Renaix, Belgium. Failure of crankshaft lug due to bad installation of counterweight rollers.

SMITH AEROSTAR (See Ted Smith Aerostar)

SNOW S-2

Engine

E159	Snow Commander S2D	6 Dec 71	0	S	Thompson Town, Jamaica. Master connecting rod at crank pin end.
E175	Snow S-2D	18 Sep 72	0	S	Ngakuru, New Zealand. Master rod piston pin bore.
E176	Snow Commander S2D	25 Sep 72	0	S	Windsor, Jamaica. No. 1 cylinder connecting rod.
E194	Snow S2C	30 Jun 73	0	S	Pearsall, Tex. USA. Crevice corrosion found on no. 7 piston pin. Fatigue fracture.
E241	Snow Commander S2D	15 Aug 75	0	S	Riversdale, Jamaica. Master connecting rod.

Propeller

F43	Snow 600 S-2C	29 Aug 66	0	S	Bay, Ark. USA. Propeller blade, 13 inches from tip.
F65	Snow S-2A	15 Nov 67	1	D	Dateland, Ariz. USA. Propeller blade.
F100	Snow S-2D	4 Aug 71	0	S	Moana, New Zealand. 7 inches of blade shed (stone damage).

Landing Gear

G332	Aero Commander Snow	3 Aug 72	0	S	Cashmore Airstrip Kinleith, New Zealand. AN9-52 bolt, linking upper tripod to shock strut of right gear.

SOCATA 880/885/892/893/894 RALLYE

Engine

E322	Socata 893A Rallye Commodore	19 Nov 78	0	S	Duena, W. Germany. Broken oil line of engine.

Propeller

F157	Socata 894A Rallye Minerva	26 Sep 75	0	S	Hamm-Lippewiesen, W. Germany. Adjustment fork broken in hydraulic pitch control system for propeller.

Landing Gear

G353	Socata 880B Rallye Club	17 Jul 73	0	S	Bad Duerkheim, W. Germany. Strut attachment of front gear leg.
G400	Socata 892A Rallye-Commodore	17 Jun 75	0	S	Huensborn, W. Germany. Nosewheel axle spindle bolts.
G409	Socata 885 Super Rallye	12 Oct 75	0	S	Noerdlingen, W. Germany. Main landing gear strut attachment.

SPORTAVIA RF4D AVION-PLANEUR (MOTOR GLIDER)

Landing Gear

G354	Sportavia RF4D Avion-Planeur	5 Aug 73	0	S	Vielbrunn, W. Germany. Landing gear.

STAMPE SV-4B

Engine

E369	Stampe SV-4B	10 Oct 80	0	D	Baragwanath, Republic of South Africa. Crankshaft failed just behind thrust bearing. Origin: corner of keyway which locates prop hub flange. Gipsy Major 1 Mark 10-3 engine.

STEARMAN KAYDET (See Boeing/Stearman 75 Kaydet)

STEEN SKYBOLT I

Engine

E358	Steen Skybolt I	22 May 80	0	S	Brantford, Ont. Canada. Connecting rod bolt. Induced by over-speeding attributed to conversion of approved constant speed prop to fixed pitch.

STINSON A2W

	Wing				
A25	Stinson A2W	10 Jan 45	10	D	Spring Plains, Victoria, Australia. Left wing failure. Joint in welded steel tube between outer & centre sections of wing. Material: X4130 steel. 13,763 airframe hours.

STINSON 76 SENTINEL (L-5)

	Landing Gear				
G309	Stinson L-5G	27 Jun 71	0	S	Murfreesboro, Tenn. USA. Tail wheel (old crack). Annual inspection overdue.

STINSON SR-8C RELIANT

	Landing Gear				
G444	Stinson SR-8C	10 Apr 77	0	S	Eveleth, Minn. USA. Landing gear.

STINSON V-77

	Engine				
E145	Stinson V-77	2 Apr 71	0	S	Pleasant Plain, Ohio. USA. # 2 connecting rod (upper end).
	Landing Gear				
G210	Stinson V-77	20 May 67	0	S	Lincoln, R.I. USA. Left landing gear oleo piston rod.

STINSON 108

	Engine				
E31	Stinson 108	26 Jan 64	0	S	Hammond, La. USA. No. 5 cylinder at barrel casting.
E55	Stinson 108-2	24 Jun 65	0	D	Kenosha, Wis. USA. No. 4 cylinder exhaust valve.
E60	Stinson 108-2	4 Sep 65	0	S	Oak Hill, W.Va. USA. No. 6 cylinder exhaust valve.
E187	Stinson 108-1	23 Jan 73	0	S	Fort Pierce, Fla. USA. No. 1 cylinder (at base).
E207	Stinson 108-1	17 Mar 74	0	S	Tekoa, Wash. USA. Muffler fatigue fracture.
E258	Stinson 108-1	24 Apr 76	1	D	Aglasterhausen, West Germany. Crankshaft.
E332	Stinson 108-2	14 Apr 79	0	S	Sidney, Mont. USA. No. 1 cylinder at base.
E359	Stinson 108 Voyager	9 Jun 80	0	S	Rockland, Ont. Canada. Crankshaft aft of front main bearing. Origin: grinding crack. Franklin 6A engine.
E386	Stinson 108-1	13 Apr 81	0	D	Manahawkin, NJ, USA. Crankshaft, P/N 17576, failed at cranckcheek between no. 1 & 2 crankpin journals.

	Propeller				
F22	Stinson 108-3	29 Dec 64	0	D	Van Nuys, Calif. USA. Propeller blade.
F32	Stinson 108	19 Aug 65	0	S	Fairbanks, Alas. USA. Prop blade. Metal leading edge separated from wood prop blade.
F61	Stinson 108	22 Oct 67	0	S	Moweaqua, Ill. USA. Crankshaft propeller bolt flange.
	Landing Gear				
G126	Stinson 108-2	1 Sep 65	0	S	Huron, S.Dak. USA. Tail wheel attach tubing structure.
G130	Stinson 108-1	28 Sep 65	0	S	Grand Rapids, Mich. USA. Tail wheel spring assembly.
G159	Stinson 108-1	20 Feb 66	0	S	Shirley, Mass. USA. Right main gear hinge pin.
G205	Stinson 108-1	9 Apr 67	0	S	Brookhaven, N.Y. USA. Tubular member attached to tailwheel and fuselage failed.

STITS

	Tail				
B15	Glendening Stits	24 Dec 67	1	D	Corona, Calif. USA. Left horizontal-stabilizer attach fitting.
B23	Stits SA-3A Playboy	10 Jun 73	1	D	Macomb, Illinois USA. Horiz. stabilizer failed. Lead edge mount tube broken at attach hole.
	Landing Gear				
G218	Stits SA3B	2 Sep 67	0	S	Owatonna, Minn. USA. Failure of pedal torque tube attached to nose steering broken welds on brace tubes from engine mount to gear.

STOLP STARDUSTER

	Landing Gear				
G501	Stolp Starduster Too	5 Apr 80	0	S	Ashland, Oh. USA. Main gear, tubular structure at fuselage attachment point.

SUD-AVIATION (See Aerospatiale)

SWEARINGEN SA-226 METRO II

	Engine				
E405	Swearingen SA-226TC Metro II	23 Mar 82	0	S	Saskatoon, Sask. Canada. Stator support (thermal fatigue due to engine start-ups). 5298 cycles. Garret Airesearch 331 engine.
	Landing Gear				
G507	Swearingen SA-226A	16 Jun 80	0	S	Birmingham, Al. USA. Right main gear door uplock roller.

TAYLORCRAFT BC-65

	Engine				
E86	Taylorcraft BC-65	2 Aug 66	0	S	Midland, Mich. USA. Throttle shaft separated from carburetor throttle arm.
	Landing Gear				
G140	Taylorcraft BC-12D1	7 Nov 65	0	S	Westerly, R.I. USA. Tube brace strut, left main gear (weld repair).

TED SMITH AEROSTAR

	Engine				
E346	Ted Smith Aerostar 601P	16 Nov 79	3	D	Charlstadt, N.J. USA. Exhaust pipe assembly at flange weld
	Landing Gear				
G274	Ted Smith Aerostar 600	1 Apr 70	0	S	Bedford, Pa. USA. Main landing gear piston. Cracks formed during heat treatment process.
G470	Ted Smith Aerostar 601P	20 Sep 78	0	S	Stansted, UK. Torque links on both main gear legs.

TEMCO D-16

	Propeller				
F28	Temco D-16A	7 Apr 65	0	D	Jacksonville, Texas USA. Right propeller blade, 30 in. from hub.
	Landing Gear				
G161	Temco D-16A	16 Mar 66	0	S	Jackson, Miss. USA. Nose gear collar attach retract rods.

THORP T-18 TIGER

	Propeller				
F210	Thorp T-18 Tiger	11 May 79	0	D	Zillah, Wa. USA. Propeller blade.

TRANSAVIA PL-12 AIRTRUK

	Propeller				
F108	Transavia PL-12 Airtruk	3 Mar 72	0	S	Roydon Downs, New Zealand. Propeller hub.
F113	Transavia PL-12 Airtruk	26 May 72	0	S	Wainui, New Zealand. Propeller blade (thread).
F166	Transavia PL-12 Airtruk	18 Feb 76	0	S	Matahiwi, New Zealand. Propeller blade.
	Landing Gear				
G265	Transavia PL-12 Airtruk	1970	0	S	Narrabri, NSW, Australia. Nose landing gear strut.
G317	Transavia PL-12 Airtruk	1972	0	S	Mudee, NSW, Australia. Port landing gear, inner pivot attach lug.
G318	Transavia PL-12 Airtruk	1972	0	S	Omeo, Vict. Australia. Nose gear at weld.

G339	Transavia PL-12 Airtruk	1973	0	S	Corryong, Vict., Australia. Nose gear support structure faulty.
G358	Transavia PL-12 Airtruk	6 Sep 73	1	S	Swan Vale, N.S.W., Australia. Nosewheel steering pin.
G363	Transavia PL-12 Airtruk	1974	0	S	Geraldton, WA, Australia. Right main wheel pivot bracket (weld).
G364	Transavia PL-12 Airtruk	1974	0	S	Mudgee, NSW, Australia. Poor weld, nose strut to engine mount.
G376	Transavia PL-12 Airtruk	6 May 74	1	S	Ashley-Clinton, New Zealand. Incompletely-modified nosewheel pivot leg assembly failed.
G473	Transavia PL-12 Airtruk	1979	0	S	Mudgee, NSW, Australia. Right main gear, attach lugs.

TRAVEL AIR D4000

Landing Gear

G246	Travel Air D4000	20 Jan 69	0	S	Tallulah, La. USA. Right main gear separated at fuselage.

TURBULENT

Engine

E30	Turbulent	26 May 63	0	D	Guildford, UK. Crankshaft.

UTVA WEIHE (SAILPLANE)

Flight Controls

D30	UTVA Weihe	11 Jul 76	0	S	Alte Ems, W. Germany. Left hand rudder cable.

VARGA 2150 KACHINA (MORRISEY 2150)

Flight Controls

D47	Varga 2150A Kachina	31 Jul 81	2	D	Stevensville, Md. USA. Elevator horn P/N VAC 6000K-26 failed.

Landing Gear

G114	Morrisey 2150A	19 May 65	0	S	Gainesville, Ga. USA. Left gear scissor attach bracket

VICKERS SUPER VC.10

Flaps

D13	Vickers Super VC.10	9 Aug 67	0	S	New York, N.Y. USA. Section of starboard flap separated (broken lug on flap trolley).

VICKERS VANGUARD

Fuselage

C21	Vickers 951 Vanguard	2 Oct 71	63	D	Aarsele, Belgium. Rear bulkhead failure, causing separation of both tailplanes. Initiated by stress corrosion

VICKERS VIKING

	Wing				
A32	Vickers Viking	1951	0	S	Central Africa. Inspection found centre-section spar boom completely failed. Failure probably occurred with "bang" 3 months previously, but post-flight inspection could not locate failure at that time. Matl: DTD 464 (equiv 24ST). 6800 airframe hrs.
A42	Vickers Viking	29 Mar 53	13	D	Mtara, Tanganyika. Wing failure. Single-spar mainplane joint, lower spar boom, WS 141. Material: DTD 363 (equiv 75ST). Airframe hours: 8800

VICKERS VISCOUNT

	Wing				
A88	Vickers Viscount 720C	31 Dec 68	26	D	Port Hedland, Western Australia. Separation of starboard wing. Main spar lower boom, WS 143. Fatigue endurance reduced by insertion of flared bushings.
	Tail				
B25	Vickers Viscount 785	8 Jun 74	44	D	Cerro El Retiro, Colombia. Separation of left tailplane (spar).
	Flaps				
D4	Vickers Viscount 701	14 Mar 57	20	D	Manchester, England. Bolt failure, starboard no. 2 flap attachment.
	Engine				
E74	Vickers Viscount	6 Feb 66	0	S	Lyons/Paris, France. Annulus gear in reduction section of #1 engine.
E90	Vickers Viscount 724	17 Dec 66	0	S	Edmonton, Alta. Canada. 1st stage impeller, no. 3 engine compressor.
	Propeller				
F57	Vickers Viscount	23 Jul 67	0	S	Over Germany. Propeller retaining bolt (incorrect assembly).
	Landing Gear				
G6	Vickers Viscount	12 Dec 54	0	S	Blackbushe Airport, UK. Back-stay bracket of right gear.
G7	Vickers Viscount	30 Apr 57	0	S	Townsland, Qld. Australia. Trunnion block. Nose gear actuating jack disconnected from strut.
G11	Vickers Viscount 700D	3 Apr 59	0	S	Detroit, Mich. USA. Distortion of landing gear uplock lever due to fatigue cracks.
G213	Vickers 745D Viscount	26 Jun 67	0	S	Grand Rapids, Mich. USA. Nose wheel pivot pin (lubrication holes).

G224	Vickers 745D Viscount	28 Nov 67	0	S	Raleigh-Durham, N.C. USA. Valve body of nose wheel steering jack twin relief valve.
G351	Vickers Viscount	8 Jun 73	0	S	East Midlands, UK. Nose undercarriage support structure.
G406	Vickers Viscount	14 Sep 75	0	S	Guernsey, Channel Is., UK. Nosewheel rear drag members in plane of rear flange member of downlock beam.
G484	Vickers Viscount VC-2	25 May 79	0	S	Cardiff Airport, Wales, UK. Bolt in uplock mechanism of left gear.

VICKERS-ARMSTRONGS WELLINGTON

Wing

A4 to A23	Vickers-Armstrongs Wellington	May 42 to 1944	?	D	England. Wing failure. Lower spar boom at serration of boom joint outboard of nacelle (WS 41). 20 aircraft lost in 2-year period. Most failures at WS 41. Airframe hours: 180-400

VICTA 210 AIRCRUISER

Engine

E150	Victa 210 CS	30 Jul 71	0	S	Cromwell, New Zealand. Fuel discharge tube.

VOLLMER SPORTSMAN

Engine

E215	Vollmer Sportsman	3 Aug 74	0	S	Webster, Wis. USA. No. 1 and 3 exhaust stacks.

VOLPAR 18 (See Beech 18)

VOUGHT A-7 CORSAIR II

Engine

E161	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine.
E162	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine.
E163	LTV A-7 Corsair II (USAF or USN)	1972	?	D	USA? Spacer collar between 1st & 2nd compressor stages, Rolls-Royce Allison TF41 Spey engine.

Landing Gear

G294	Vought A-7 Corsair II (USAF)	1971	1	?	? Nose gear failed during catapult launch. Crack in landing gear strut.
G295	Vought A-7 Corsair II (USAF)	1971	0	?	? Nose gear failed during catapult launch. Crack in landing gear strut.

WACO UPF-7

	Propeller				
F189	Waco UPF-7	29 Oct 77	2	D	Palmyra, NY. USA. 13 in. of propeller blade separated.

WITTMAN TAILWIND

	Landing Gear				
G514	Wittman Tailwind	4 Nov 80	0	S	Payson, Az. USA. Modified fork shaft housing on tail wheel assembly at weld bead.

ZLIN (See Morovan Zlin)

TYPE UNKNOWN (FIXED WING)

	Wing				
A3	Type unknown	pre 1940	1?	D	USA? Welded wing strut failed, causing collapse of wing and fatal crash.

TYPE UNKNOWN (FIXED WING)

	Tail				
B5	Type unknown (probably US military)	pre-1945	?	D	USA? Vertical tail separated. Crack in stabilizer rear spar attachment to fuselage, starting at free edge of 0.051 Al alloy. Failures after 2000 hours.

TYPE UNKNOWN (FIXED WING BOMBER)

	Wing				
A64	Military bomber (French)	approx 1963	?	D	France? Wing failure. Lower boom, forward spar, 2014 forging. Origin: fretting at bolt hole edge.

TYPE UNKNOWN (FIXED WING)

	Wing				
A65	Old military aircraft (French)	approx 1963	?	D	France? Wing failure. Lower boom, forward spar, 2014 forging. Origin: flaw at external sharp angle.

TYPE UNKNOWN (FIXED WING)

	Propeller				
F1	Type unknown	pre-1941	0	D	USA. Propeller blade. Origin: stress concentration where patent number was stamped into blade. 115 airframe hours.

TYPE UNKNOWN (US MEDIUM PATROL BOMBER)

	Landing Gear				
G2	US medium patrol bomber (tail-wheel) (USAAC)	Oct 42	?	?	? Failure in torque scissors fitting welded to outer cylinder of main gear shock strut (Bendix). Weld between fitting & cylinder barrel.

G3	US medium patrol bomber (tail-wheel) (USAAC)	WW II	?	?	USA? Failure in drag brace strut fitting on outer cylinder of main gear shock strut (Bendix).

TYPE UNKNOWN (FIXED WING, US NAVY ATTACK AIRCRAFT)

Wing

A29	Attack-type airplane (US Navy)	approx 1950	?	?	USA? Wing failure. Role: dive bombing & rocket launching.
A30	Attack-type airplane (US Navy)	approx 1950	?	?	USA? Wing failure. Role: dive bombing & rocket launching.

TYPE UNKNOWN (FIXED WING, US NAVY FIGHTER)

Wing

A31	Piston-engine fighter (US Navy)	approx 1950-52	?	?	USA? Wing failure. Role: training in ground support tactics, rocket launching runs.

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NOTES

13

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SUMMARY/SOMMAIRE

A world-wide survey was done of serious aircraft accidents involving fatigue fracture. Volume 1 of the report deals with fixed-wing aircraft, while Volume 2 addresses rotary-wing aircraft. A total of 1466 fixed-wing accidents since 1927 were identified as having fatigue fracture as a related cause, and these accidents resulted in 1861 fatalities. The accidents cover civil and, to a limited extent, military aircraft. Accidents are listed by failure type, as well as by aircraft type. Engine/transmission failure and landing-gear failure were the most common cause of recent fixed-wing accidents, and currently there is an average of about 69 fixed-wing fatigue accidents per year.

15

Volume

2

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Canada

A SURVEY OF SERIOUS AIRCRAFT ACCIDENTS INVOLVING FATIGUE FRACTURE

VOL. 2
ROTARY-WING AIRCRAFT

by

Glen S. Campbell, R.T.C. Lahey

National Aeronautical Establishment

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A SURVEY OF SERIOUS AIRCRAFT ACCIDENTS INVOLVING FATIGUE FRACTURE

VOL. 2 — ROTARY-WING AIRCRAFT

ÉTUDE SUR DES ACCIDENTS IMPORTANTS D'AVIONS DÛ AUX EFFETS DES FRACTURES DE FATIGUE

VOLUME 2 — EFFETS SUR DES HÉLICOPTÈRES

by/par

Glen S. Campbell and R.T.C. Lahey

National Aeronautical Establishment

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APRIL 1983

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SUMMARY

This is Volume 2 of a world-wide survey of serious aircraft accidents involving fatigue fracture. Volume 2 of the report deals with rotary-wing aircraft, while Volume 1 addressed fixed-wing aircraft. A total of 419 rotary-wing accidents since 1937 were identified as having fatigue fracture as a related cause, and these accidents resulted in 379 fatalities. The accidents cover civil and, to a limited extent, military aircraft. Accidents are listed by failure type, as well as by aircraft type. Engine/transmission failure and tail-rotor failure were the most common cause of rotary-wing accidents, and currently there is an average of about 31 rotary-wing fatigue accidents per year.

RÉSUMÉ

Ceci est le volume 2 d'une étude mondiale sur les accidents importants d'avions dû aux effets des fractures de fatigue. Il porte sur les hélicoptères tandis que le volume 1 traite des avions. Depuis 1937, il y eu 419 accidents d'hélicoptères résultant de fractures dû aux effets de fatigue. De tous ces accidents, 379 personnes sont décédées. La plupart de ces accidents touchent les hélicoptères civils tandis qu'un nombre limité touche les hélicoptères militaires. Il existe deux listes qui décrivent ces accidents. L'une divise les accidents en différents types de fractures tandis que l'autre divise les accidents suivant les modèles d'hélicoptères. Les deux causes importantes d'accidents sont les fractures au bloc moteur/transmission et les fractures au rotor de queue. Actuellement, il y a environ 31 accidents d'hélicoptères dû à la fatigue par année.

INDEX

PAGE

1.0 INTRODUCTION..1

2.0 DEFINITIONS AND ABBREVIATIONS 2

3.0 SOURCES OF INFORMATION..3

4.0 RESULTS...5
  4.1 Listing of Accidents..5
  4.2 List of Repeated Failures.....................................6
  4.3 Breakdown of Accidents by Year................................7
  4.4 Initiation Sites..7
  4.5 Listing of Accidents by Country...............................8

5.0 CONCLUSIONS...8

6.0 REFERENCES..9

7.0 ACKNOWLEDGEMENTS..9

TABLES
TABLE 1 - Summary of Accidents - Rotary-Wing............................13
TABLE 2 - List of Repeated Fatigue Failures - Rotary-Wing...............14
TABLE 3 - Breakdown of Accident Types by Year of Accident - Rotary-Wing..17
TABLE 4 - Initiation Sites - Rotary-Wing................................18
Table 5 - List of Accidents by Country - Rotary-Wing....................19
  Part I. Civil Aircraft..19
  Part II. Military Aircraft..20

FIGURES
FIG. 1 Number of Serious Fatigue Accidents - Fixed-Wing & Rotary-Wing....21
FIG. 2 Number of Serious Aircraft Accidents - Fixed-Wing.................22
FIG. 3 Number of Serious Aircraft Accidents - Rotary-Wing................22
FIG. 4 Causes of Fatigue Failures - Rotary-Wing..........................23

APPENDICES

PART I - LISTING BY FAILURE TYPE

J ROTARY-WING - MAIN ROTOR SYSTEM....................................J-1
K ROTARY-WING - TAIL ROTOR...K-1
L ROTARY-WING - AIRFRAME...L-1
M ROTARY-WING - FLIGHT CONTROLS......................................M-1
N ROTARY-WING - ENGINE OR TRANSMISSION...............................N-1
O ROTARY-WING - LANDING GEAR...O-1
P ROTARY-WING - MISCELLANEOUS..P-1

PART II - LISTING BY AIRCRAFT TYPE
Q LIST OF ROTARY-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE

  Aerospatiale SA 315 Lama..Q-1
  Aerospatiale AS 316/3160 Alouette III.............................Q-1

INDEX (Cont'd) Page

Aerospatiale SA 318 Alouette II..............................Q-1
Aerospatiale SA 330 Puma.....................................Q-2
Aerospatiale SA 341 Gazelle..................................Q-2
Aerospatiale AS 350 Astar/Ecureuil...........................Q-2
Aerospatiale SA 360 Dauphin..................................Q-2
Agusta Bell (See Bell).......................................Q-3
Air & Space 18...Q-3

Bell 47/Kawasaki KH-4..Q-3
Bell 204 (UH-1/B/M Iroquois).................................Q-11
Bell 205 (UH-1D/H Iroquois)..................................Q-11
Bell 205A-1..Q-12
Bell 206 JetRanger/LongRanger................................Q-12
Bell OH-58 Kiowa...Q-14
Bell Model 209 (AH-1 HueyCobra)..............................Q-15
Bell 212 Twin Two-Twelve.....................................Q-15
Bell 214...Q-15
Bell 222...Q-16
Bensen B-8M Gyro-Copter......................................Q-16
Boeing Vertol Model 42 (See Vertol Model 42).................Q-31
Boeing Vertol Model 44 (See Vertol Model 44).................Q-31
Boeing Vertol Model 107/CH-46................................Q-16
Boeing Vertol CH-47 Chinook..................................Q-17
Brantly B-2..Q-17
Brantly 305..Q-18

Cierva Air Horse...Q-19

Enstrom F-28A..Q-19

Fairchild Hiller FH-1100.....................................Q-20
Fairy Aviation FB-1 Gyrodyne.................................Q-20

Hiller Model 360/UH-12.......................................Q-20
Hiller FH-1100 (See Fairchild Hiller FH-1100.................Q-20
Hughes 269...Q-22
Hughes 369/500/OH-6A Cayuse..................................Q-25

Kaman HH-43..Q-26
Kawasaki KH-4 (See Bell 47)..................................Q-3
Kawasaki KV-107 (See Boeing Vertol Model 107)................Q-16

MBB BO 105...Q-27

Robinson R22...Q-27
Rotorway Scorpion Too..Q-27

S.N.I.A.S. (See Aerospatiale)................................Q-1
Sikorsky S-51..Q-27
Sikorsky S-52..Q-27
Sikorsky/Westland S-55 (H-19)................................Q-27
Sikorsky S-58/Westland Wessex................................Q-28
Sikorsky S-61 (SH-3 Sea King)................................Q-29

INDEX (Cont'd) Page

Sikorsky S-62..Q-30
Sikorsky S-64 Skycrane (CH-54)..................................Q-30
Sikorsky S-65A (HH-53/CH-53 Sea Stallion).......................Q-30
Sikorsky S-76 Spirit..Q-31
Soloy 47 (See Bell 47)..Q-3
Sud Aviation (See Aerospatiale).................................Q-1

Tom Cat I...Q-31

Vertol Model 42/H-21 Work Horse.................................Q-31
Vertol Model 44...Q-31
Vertol Model 107 (See Boeing Vertol Model 107/CH-46)............Q-16

Westland Wessex (See Sikosky S-58)..............................Q-28
Westland Whirlwind (See Sikorsky S-55)..........................Q-27
Westland Sea King (See Sikorsky S-61)...........................Q-29

Type Unknown (Autogyro)...Q-31
Type Unknown (Helicopter).......................................Q-32
Type Unknown (Helicopter).......................................Q-32

1.0 INTRODUCTION

This report is Volume 2 of a study of serious aircraft accidents involving fatigue fracture. Volume 1 (Ref. 1) deals with fixed-wing aircraft, while Volume 2 addresses rotary-wing aircraft. The present study is a follow-up to References 2 and 3, which listed fatal aircraft accidents (both fixed-wing and rotary-wing) involving metal fatigue.

That study listed civil and, to a limited extent, military accidents worldwide for the period 1934 to early 1980. The listing was not complete, as it was difficult to obtain information on accidents that happened prior to the early 1960s. The exception was for large civil aircraft, for which complete records go back to about 1945. Nonetheless, the survey was able to document a total of 306 accidents, in which a total of 1803 people were killed. The results also showed that worldwide there was at that time an average of 18 fatal aircraft accidents per year resulting from metal fatigue.

That study excluded a number of significant fatigue failures for which a fatality did not occur, either because of piloting skill or because of good fortune. In the present study, the survey has been expanded to include accidents involving either

- a fatality,
- substantial damage to the airframe, or
- aircraft destroyed.

Accidents are included in the survey if fatigue fracture was somehow involved, although not necessarily as the primary cause of the accident.

The results of the survey are given in two parts:

- Volume 1 - fixed-wing aircraft (Ref. 1),
- Volume 2 - rotary-wing aircraft (this report).

The complete survey covers both fixed-wing aircraft and helicopters, and lists 1885 accidents since 1927, involving 2240 fatalities.

This volume (rotary-wing aircraft) lists 419 accidents, which have resulted in 379 fatalities. The accidents are listed two ways, first by failure type, such as main-rotor or tail-rotor failure, and secondly by aircraft type.

It should be noted that this survey cannot be claimed to be comprehensive, and is restricted to the sources listed in Section 3. The survey does, however, indicate the magnitude of the fatigue problem.

How to Use This Report

In this report, the information is presented a number of different ways:

(1) For a listing of accidents by major component or system, see the following Appendices:

- main-rotor system	Appendix J
- tail-rotor	Appendix K
- airframe	Appendix L
- flight controls	Appendix M
- engine or transmission	Appendix N
- landing gear	Appendix O
- miscellaneous	Appendix P

(Note: The Appendices in this report begin at Appendix J. Appendices A to I are found in Volume 1, and deal with fixed-wing aircraft.)

(2) For a listing of fatigue failures experienced by a particular aircraft type, see Appendix Q ("LIST OF ROTARY-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE"). A summary of repeated fatigue failures is found in Table 2 ("LIST OF REPEATED FATIGUE FAILURES - ROTARY-WING").

(3) To find out what accidents occurred in a particular country, or belonging to a particular military service, see the cross-reference listing in Table 5 ("LIST OF ACCIDENTS BY COUNTRY - ROTARY-WING") and use the identification number to find the corresponding accident in Appendices J through P.

(4) To find out accidents occurring from a particular form of crack initiation (for example "fretting"), look up the cross-reference list in Table 4, and use the identification number to find the accident in Appendices J through P.

2.0 DEFINITIONS AND ABBREVIATIONS

The definition of "aircraft accident" in this report is the one used by the International Civil Aviation Organization (Ref. 4):

> "Aircraft Accident: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all persons have disembarked, in which:
>
> (a) any person suffers death or serious injury as a result of being in or upon the aircraft by direct contact with the aircraft or anything attached thereto, or
> (b) the aircraft receives substantial damage.
>
> Substantial Damage: Damage or structural failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft and which would normally require the major repair or replacement of the affected component. The following types of damage are specifically excluded: engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, taxiing damage to propeller blades, damage to tires, engine accessories, brakes, or wing tips."

List of Abbreviations Used

The following abbreviations have been used in this report:

AA	Administration de l'Aeronautique (Belgium).
AD	Airworthiness Directive.
AF	Air Force.
AFFDL	US Air Force Flight Dynamics Laboratory.
AHS	American Helicopter Society.
ARC	UK Aeronautical Research Council.
ARL	Australian Aeronautical Research Laboratories.
ASTM	American Society for Testing and Materials.
AWST	"AVIATION WEEK & SPACE TECHNOLOGY" magazine.
AW	"AVIATION WEEK" magazine.
BoA	Board of Aviation.
BoT	Board of Trade.
CAA	UK Civil Aviation Authority.
CAB	US Civil Aeronautics Board.
CF ACAIRS	Canadian Forces Aircraft Accident Reporting System (a computer storage/retrieval system for accident data).
D	Substantial damage to the airframe.
Dam	Damage to the airframe.
DoT	Department of Transport.
FI	"FLIGHT INTERNATIONAL" magazine.
ICAF	International Committee on Aeronautical Fatigue.
ICAO	International Civil Aviation Organization.
ICAO AAD	ICAO "AIRCRAFT ACCIDENT DIGEST".
ICAO ADREP	ICAO Accident Data Report (a computer storage/retrieval system for accident data).
MLG	Main landing gear.
MoT	Ministry of Transport (Canada).
NBS	US National Bureau of Standards.
NTSB	National Transportation Safety Board (USA).
NTSB AAR	NTSB Aircraft Accident Report.
NZ AAR	New Zealand Aircraft Accident Report.
NZ AIB	New Zealand Accident Investigation Bureau.
RAN	Royal Australian Navy
RAAF	Royal Australian Air Force
RAF	Royal Air Force, UK
S	Substantial damage.
UK	United Kingdom.
USAF	United States Air Force.
WAAS	"WORLD AIRLINE ACCIDENT SUMMARY" (Ref. 5).
WADC	Wright Air Development Centre
WHAS	"WORLD HELICOPTER ACCIDENT SUMMARY" (part 2 of Ref. 5).

3.0 SOURCES OF INFORMATION

The following sources were used for information on fatigue-related accidents:

World-Wide Civil Accidents

1. "WORLD HELICOPTER ACCIDENT SUMMARY" (part 2 of Ref. 5). This reference, which is updated several times per year, lists all civil aircraft accidents that have occurred since 1956. Rotary-wing aircraft over 4550 kg (10,000 lb) maximum gross weight are covered.

2. International Civil Aviation Organization (ICAO). ICAO has a computer data-bank of all civil aircraft accidents for 1970 and onwards. The data-bank covers all civil aircraft, both fixed-wing and helicopter, whose gross weight is over 2250 kg (4960 lb).

3. Magazines, such as "AVIATION WEEK & SPACE TECHNOLOGY", "FLIGHT INTERNATIONAL", and "INTERNATIONAL HELICOPTER".

In addition, all the member countries of ICAO were queried for civil accident information, and National Delegates from the International Committee on Aeronautical Fatigue were asked to obtain whatever information was openly available from the military authorities in their country. The following countries provided information for the periods indicated:

CIVIL

Argentina
Australia (1969 - mid-1981)
Barbados
Belgium (1950 - mid-1981)
Brazil
Burma
Canada (1916 - mid-1982)
Cape Verde
Cyprus
Egypt
Finland (1962 - Jan. 1982)
Federal Republic of
Germany (1975 - Aug. 1981)
Greece
Guyana
Hong Kong
Iceland
Iraq
Ireland
Jamaica (1966 - 1981)
Japan (1973 - Feb. 81)
Kenya
Lethoso
Malaysia
Malawi
Malta
Mexico
Netherlands
New Zealand
Norway
Pakistan
Papua New Guinea
Portugal
Rwanda
Seychelles
South Africa (to April 1981)
Sweden
Switzerland
Thailand
USA (1964 - late 1981)

MILITARY

Royal Australian Air Force (1953 - 1981)
Royal Australian Navy (1959 - 1981)
Belgian Air Force (to mid-1981)
Canadian Forces (1950 - early 1981)
Swedish Air Force (1967 - Aug. 1981)
UK - Royal Air Force
US Army (1972 - Mar. 1981)

Data on accidents prior to the introduction of the ICAO reporting system in the late 1940s are very difficult to obtain. Details of accidents to aircraft below 2250 kg (4960 lb) gross weight (the lower limit for which accidents are reported to ICAO) are scarce prior to the mid 1960s, when countries began transferring to computer storage and retrieval of accident data.

There are almost no accident data available from communist countries, as they do not divulge accident data, not even to ICAO.

Because of security reasons, only six countries were able to provide data on accidents to military aircraft. The few examples from other countries included in this report were obtained from news reports and trade publications.

4.0 RESULTS

The results of the survey are summarized in Table 1. A total of 419 rotary-wing accidents were found, resulting in 379 fatalities. Including the fixed-wing accidents from Volume 1 of this survey (Ref. 1) gives a combined fixed-wing and rotary-wing total of 1885 accidents and 2240 fatalities. A total of 393 fixed-wing and 165 rotary-wing aircraft were destroyed.

For rotary-wing aircraft, failure of the engine or transmission was the most common fatigue problem, and accounted for 32% of the accidents. Following close behind was tail rotor failures (24% of the rotary-wing accidents), and then the main-rotor system (13%).

4.1 Listing of Accidents

Where possible the following information is given in the listings for each accident:

- Aircraft type
- Aircraft operator (private aircraft excepted)
- Accident date
- Damage to airframe ("D" = destroyed, "S" = substantial)
- Number of fatalities
- Geographical location of the accident
- A brief description of the location of the fatigue failure
- A reference to the accident report number, or where information on the accident was obtained. (To conserve space, references are only given in the listing by failure type).

Each accident has been assigned an identification number for cross-referencing purposes. The identification number consists of a letter, corresponding to the Appendix in which the accident is listed, and a number, referring to the number of the accident within the Appendix. For example, the identification number J39 refers to the 39th accident listed in Appendix J (rotary-wing aircraft, main-rotor system failure).

The listing of fixed-wing accidents according to failure type is found in Appendices J through P.

The earliest reported accident was the 1937 failure of a main rotor blade of a U.S. Air Force autogyro of unspecified type (item J1 in Appendix J). Fortunately, as the rotor blade was shed, the pilot and observer were both thrown clear and parachuted to safety. The tubular blade spar was attached to a fork at the inboard end of the blade by means of pins, and failure occurred at the outboard pin hole (Ref. 6).

The listing of accidents by aircraft type is given in Appendix Q. Three accidents occurred for which the aircraft type was not specified, and these are listed at the end of Appendix Q under the headings "Type Unknown". The authors welcome any further information on these accidents.

4.2 List of Repeated Failures

Table 2 lists rotary-wing aircraft that have had more than one serious accident resulting from metal fatigue of the same general area. (There is a similar list for fixed-wing aircraft in Reference 1.) Unfortunately, there was generally insufficient information available to determine if these failures were in precisely the same part and location.

The ordering of the list is by number of accidents. For additional information on individual accidents, refer to the corresponding identification numbers in Appendices J through P.

In searching for repeated fatigue failures, it is advised also to check the aircraft type under Appendix Q ("Listing of Accidents by Aircraft Type"), as some accidents have insufficient information to pinpoint the exact failure location, so additional failures may appear in that Appendix that do not show up in Table 2.

Some examples of repeated failures are:

Aircraft	No. of Accidents	Failure Area
Bell 47	42	Tail rotor blade
Bell 47	7	Tail rotor blade yoke
Hughes 269	7	Tailboom
Bell 47	6	Tail rotor retention bolt
Brantly B-2	6	Tail rotor blade

It is beyond the scope of this report to examine each of the cases of repeated failure in order to determine which are still on-going and have not had sufficient action taken in order to arrest the problem. An examination of the Airworthiness Directives for the aircraft in question would be required, as well as a detailed review of the accident reports to determine if the accident was not simply a result of inadequate maintenance by the operator. Examples of recent fatigue failures that have occurred at least three times in the past include:

AIRCRAFT	FAILURE AREA	NO. OF ACCIDENTS	DATES
Bell 47	Tail rotor blade	42	1963-81
Bell 47	Tail rotor blade yoke	7	1973-80
Bell 47	Connecting rod	5	1964-81
Bell 47	Main rotor stabilizer bar	3	1964-81
Bell 47	Tail rotor driveshaft	3	1965-81
Bell 204/205	Cross tube of landing gear floats	4	1968-80
Brantly B-2	Tail rotor blade	6	1965-81
Hiller 360/UH-12E	Connecting rod	4	1952-80
Hiller 360/UH-12E	Tail rotor blade	4	1966-81
Hughes 269	Tailboom	7	1970-81
Hughes 269	Lower coupling driveshaft	3	1967-81

Some of the fatigue problems have been on-going for a number of years, as for example the Bell 47 tail rotor blades (42 accidents in 18 years), the Hughes 269 tailboom (7 accidents in 11 years), and the Brantly B-2 tail rotor blades (6 accidents in 16 years).

4.3 Breakdown of Accidents by Year

Table 3 gives a yearly breakdown of the type of fatigue failures that have occurred in rotary-wing aircraft.

The total number of reported fixed-wing plus rotary-wing accidents occurring in each year is plotted in Figure 1. The big increase in the mid-1960s is the result of improved availability of accident information with the introduction of computer-based information systems in a number of countries (particularly the introduction of the US National Transportation Safety Board system in 1964). Over the last five years there has been an average of 100 fatal accidents (fixed-wing plus rotary-wing) per year resulting from metal fatigue.

The number of fixed-wing accidents for each year is plotted in Figure 2, while the number of rotary-wing accidents is shown in Figure 3. Averaged over the past five years, rotary-wing aircraft have had 31 serious accidents per year.

Figure 4 shows the breakdown of rotary-wing accidents by failure type. Since 1976, engine/transmission fatigue failures have been the most common accident cause, with 11 accidents per year on average, followed by tail rotor problems (7 per year), and failures in the main rotor system (4 per year).

4.4 Initiation Sites

The fatigue-crack initiation sites for the rotary-wing accidents are listed in Table 4. The identification numbers that are given can be used to look up the corresponding accident in Appendices J through P. Some failures are listed under more than one cause. For example, accident M29 in Appendix M was initiated by fretting at a bolt hole, so the accident is listed in Table 4 under "Fastener Hole", as well as "Fretting". The initiation sites are summarized as follows:

INITIATION SITE	NO. OF ACCIDENTS
Bolt, stud or screw	32
Fillet, radius, or other stress concentration	22
Corrosion	19
Fastener hole or other hole	12
Fretting	10
Manufacturing defect or tool mark	9
Brinnelling, galling or wear	7
Thread (other than bolt or stud)	4
Weld	3
Subsurface flaw	3
Softened condition or subsurface decarburization	2
Surface scratch or damage	2

The above total does not equal the number of accidents in the survey, since information about the initiation site is unavailable in many cases.

4.5 Listing of Accidents by Country

Table 5 gives a cross-reference list of accidents by the country of occurrence. The identification numbers that are given can be used to look up the accident in Appendices J through P. The cross-reference list is in two parts - civil aircraft, and military aircraft. For military aircraft, the accidents are listed by owner (i.e., Canadian Forces), rather than by country of occurrence.

5.0 CONCLUSIONS

1. Although this survey does not claim to be comprehensive, a total of 1885 fixed-wing and rotary-wing aircraft accidents involving fatigue fracture since 1927 are covered by this survey. These accidents claimed 2240 fatalities worldwide. Furthermore, serious fatigue-related accidents are still occurring at a rate of about 100 per year.

2. Rotary-wing aircraft accounted for 419 accidents and 379 fatalities. Recently, there has been an average of about 31 rotary-wing fatigue accidents per year.

3. The common causes of rotary-wing fatigue failures over the past few years have been engine failure/transmission failure (averaging 11 per year), tail rotor (7 per year), and main rotor system (4 per year).

4. There are many cases of repeated accidents from the same cause. Ten examples are given of rotary-wing aircraft that have had at least three similar fatigue failures, one of which was recent. A more thorough review of the accident reports and Airworthiness Directives would be required in order to determine which of these problems are still on-

going and have not had sufficient action taken in order to arrest the problem.

5. The five most common initiation sites for fatigue cracks that have resulted in rotary-wing accidents are:

(1) bolt, stud, or screw,
(2) fillet, radius, or other stress concentration,
(3) corrosion,
(4) fastener hole or other hole, and
(5) fretting.

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TABLE 1

SUMMARY OF ACCIDENTS - ROTARY-WING

CATEGORY	NO. ACCIDENTS	NO. AIRCRAFT DESTROYED	NO. FATALITIES
ROTARY-WING AIRCRAFT			
Engine or Transmission	136	40	44
Tail Rotor	100	43	81
Main Rotor System	55	31	167
Miscellaneous	45	18	22
Flight controls	37	18	34
Airframe	35	13	25
Landing Gear	11	2	6
ROTARY-WING TOTALS	419	165	379
FIXED-WING TOTALS	1466	393	1861
OVERALL TOTALS (FIXED-WING + ROTARY-WING)	1885	558	2240

TABLE 2

LIST OF REPEATED FATIGUE FAILURES - ROTARY-WING

(Note: failure may not be in exactly same part)

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS
Bell 47	42	Tail rotor blade	1963-81	K2 K4 K5 K6 K7 K8 K12 K14 K15 K17 K18 K19 K25 K27 K28 K29 K32 K33 K37 K40 K43 K44 K47 K55 K57 K59 K62 K64 K65 K67 K69 K77 K78 K79 K80 K87 K88 K90 K91 K94 K95 K96
Bell 47	7	Tail rotor blade yoke	1973-80	K39 K51 K53 K60 K70 K75 K92
Hughes 269	7	Tailboom	1970-81	L10 L12 L19 L24 L28 L32 L34
Bell 47	6	Tail rotor retention bolt	1966-75	K16 K22 K23 K34 K42 K52
Brantly B-2	6	Tail rotor blade	1965-81	K9 K30 K35 K76 K83 K100
Bell 47	5	Connecting rod	1964-81	N8 N13 N71 N102 N134
Bell 47	5	Tail rotor drive-shaft assembly	1964-72	P3 P11 P12 P14 P15
Bell 206A	5	Turbine blade	1970-75	N34 N35 N36 N45 N68
Enstrom F-28	5	Tail rotor blade	1965-77	K10 K31 K61 K63 K66
Bell 47	4	Tail rotor pitch control system (part unspecified)	1964-79	M2 M26 M27 M30
Bell 204/205	4	Cross tube of landing gear floats	1968-80	O3 O6 O7 O10
Bell 206B	4	Main rotor tension-torsion strap	1972-77	J25 J34 J36 J38
Hiller UH-12E	4	Tail rotor blade	1966-81	K20 K26 K73 K98
Hiller 360/UH-12E	4	Connecting rod	1952-80	N2 N16 N43 N119
Hughes 269	4	Stabilizer	1965-75	L1 L3 L17 L22
Bell 47	3	Main rotor blade grip	1960-72	J8 J21 J23
Bell 47	3	Main rotor drag brace clevis	1970-79	J20 J46 J48
Bell 47	3	Main rotor stabilizer bar	1964-81	J11 J22 J54
Bell 47	3	Tail rotor driveshaft	1965-81	P4 P25 P42

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - ROTARY-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS		
Bell 47	3	Cooling fan blade	1950-72	N1	N15	N49
Bell 47	3	Connecting rod bolt	1963-73	N4	N38	N54
Bell UH-1H Iroquois	3	Tail rotor blade grip	1974-75	K45	K46	K58
Bell OH-58A	3	Compressor rotor	1973-74	N53	N61	N62
Hiller 360/UH-12E	3	Con rod bolt	1966-74	N17	N29	N59
Hughes 269	3	Lower coupling driveshaft	1967-81	N23	N56	N133
Sikorsky S-55	3	Tail boom pylon ring	1965-78	L2	L13	L31
Sikorsky S-61	3	MLG fitting	1963-77	O1	O2	O8
Sikorsky CH/HH-53	3	Main rotor blade	1960?-80?	J18	J19	J30
Aerospatiale SA 318	2	Stabilizer spar tube	1974-75	L15	L20	
Bell 47	2	Tail rotor gearbox pinion shaft	1951-76	P1	P28	
Bell 47	2	Stabilizer spar tube	1970-76	L9	L26	
Bell 47	2	Tail rotor pitch change link	1967-76	M5	M17	
Bell 47	2	Piston pin	1967-68	N19	N25	
Bell 47	2	Conrod bearing	1974-77	N58	N85	
Bell 204B	2	Vertical fin	1968-77	L6	L27	
Bell 205A-1	2	Tail rotor pitch-change link	1974-78	M15	M28	
Bell 206	2	Main rotor trunnion	1977-80	J37	J50	
Bell 206B	2	Turbine blade	1979-80	N108	N124	
Bell 206A	2	Turbine wheel	1971-80	N37	N118	
Bell 206B	2	Pylon support link	1973	P19	P20	
Bell 214B-1	2	Engine accessory inner bevel gear	1977	N83	N89	
Bensen B-8M	2	Main rotor spindle	1964-67	J10	J13	
Boeing Vertol CH-47	2	Combining transmission spiral bevel gear	1974-79	N63	N106	
Brantly B-2	2	Connecting rod bolt	1965-69	N11	N27	
Brantly B-2	2	Tail rotor driveshaft assembly	1967-73	P7	P22	
Brantly 305	2	Main rotor torsion strap (clevis bearings seized)	1967	J14	J15	
Brantly 305	2	Tail rotor hub	1973-75	K38	K56	
Enstrom F-28	2	Tail rotor driveshaft	1978	P32	P33	
Fairchild Hiller FH-1100	2	Swashplate assembly	1969-74	M10	M14	
Fairchild Hiller FH-1100	2	Compressor blade	1972-79	N44	N109	
Hiller UH-12E	2	Wobble plate pylon, cyclic pitch control system	1965-76	M3	M18	
Hughes 269	2	Tail rotor blade	1964-75	K3	K48	

TABLE 2 (Cont'd)
LIST OF REPEATED FATIGUE FAILURES - ROTARY-WING

AIRCRAFT TYPE	NO. OF ACCIDENTS	FAILURE AREA	ACCIDENT DATES	IDENTIFICATION NUMBER OF ACCIDENTS	
Hughes 269	2	Connecting rod	1970-75	N32	N66
Hughes 269	2	Exhaust valve	1971-76	N39	N77
Hughes 269	2	Con rod bolts	1967-72	N22	N48
Hughes 369/500	2	Tail rotor hub	1977-78	K71	K81
Hughes 369	2	Compressor blade	1976	N74	N78
Hughes 369/500	2	Tail rotor drive flexible coupling	1979	P37	P38
Sikorsky S-55	2	Tail rotor pylon attach bolts	1968-78	L8	L30
Sikorsky S-55	2	Transmission support assembly	1972-79	P17	P39
Sikorsky S-61	2	Main rotor blade spindle lug	1978	J40	J41
Sikorsky Sea King	2	Transmission oil filter retaining bolt	1975-76	N70	N81
Sikorsky S-76	2	Main rotor spindle	1980-81	J51	J53

TABLE 3

BREAKDOWN OF ACCIDENT TYPES BY YEAR OF ACCIDENT - ROTARY-WING

YEAR	MAIN ROTOR	TAIL ROTOR	AIRFRAME	FLIGHT CONTROLS	ENGINE/ TRANSMN	LANDING GEAR	MISC	TOTAL
1937	1							1
1946	1							1
1947								0
1948								0
1949	1							1
1950				1	1			2
1951	1						1	2
1952					1			1
1953								0
1954								0
1955		1						1
1956								0
1957								0
1958								0
1959	1							1
1960	2							2
1961								0
1962								0
1963	1	1			3	1	1	7
1964	3	4		1	3		1	12
1965		7	2	1	3		1	14
1966		12	1	1	7	1	2	24
1967	3	3	2	1	5		3	17
1968	1	4	3	2	3	1	2	16
1969	1			4	5	1	1	12
1970	1	2	2	1	4			10
1971	2	1			4		2	9
1972	4	2	2	1	10		4	23
1973	1	7	2		7		4	21
1974	2	3	5	3	8	1	1	23
1975	4	12	5		8	1	4	34
1976	3	5	2	2	9		3	24
1977	2	8	3	5	13	2	1	34
1978	6	11	2	6	9	1	4	39
1979	5	8	1	1	8		4	27
1980	3	3		2	13	2	2	25
1981	3	6	2	4	12		3	30

TABLE 4

INITIATION SITES - ROTARY-WING

Bolt, Stud, or Screw (32 failures)
J39 K16 K22 K23 K34 K42 K52 K82 L1 L8 L21 L30 N3 N4
N7 N11 N17 N22 N27 N29 N48 N54 N59 N65 N70 N80 N105 N120
N131 N132 P16 P30

Fillet, Radius or Other Stress Concentration (22 failures)
J7 J50 K1 K8 K12 K14 K17 K18 K30 K35 K37 K76 K86 K88
K91 K94 L22 N77 N87 N107 N121 O1

Corrosion (19 failures)
J9 J20 J28 J29 J54 K26 K47 K48 K71 L16 M22 N74 N84 N90
N102 N120 N136 P30 P42

Fastener Hole or Other Hole (12 failures)
J1 J2 J17 K20 K68 M14 M16 M29 N115 O10 P6 P22

Fretting (10 failures)
J17 K26 L9 L10 L31 L34 M29 N43 N49 N115

Manufacturing Defect or Tool Mark (9 failures)
J13 J40 K28 K35 K54 K63 M16 N46 N121

Brinnelling, Galling, or Wear (7 failures)
J14 J53 M36 N58 N110 N119 P24

Thread (other than bolt or stud) (4 failures)
J8 J20 J51 K74

Weld (3 failures)
L14 L15 L33

Subsurface Flaw (3 failures)
N63 N123 P41

Softened Condition or Surface Decarburization (2 failures)
P32 P33

Surface Scratch or Damage (2 failures)
L24 N48

TABLE 5

LIST OF ACCIDENTS BY COUNTRY - ROTARY-WING

PART I. CIVIL AIRCRAFT

AUSTRALIA	K16 K65 K73 K88 K95 L6 L9 L11 M24 N57 N58 N65 N95 N104 N105 N112 O9
BELGIUM	J46 N1 N78
BRAZIL	J51 K85
CANADA	J8 J9 J17 J20 J25 J48 J50 K1 K2 K4 K20 K26 K35 K90 K96 K97 L2 L8 L10 L31 L34 M9 M10 M20 M28 M36 N3 N4 N6 N14-16 N24 N25 N28 N36 N73 N75 N76 N79 N83 N86 N109 N114 N118 N119 N121 N131 N132 N135 N136 P1 P2 P4 P6 P37
FINLAND	K8 K67 L23
FRANCE	K82 N2
GREENLAND	O7
ICELAND	K56 N69 P27
JAMAICA	L5 N12
JAPAN	K41 K71 L16 L22 L27 M22 M31 N74 N77 N87 N90 N102 N107 N122 N126
NETHERLANDS	J29
NEW ZEALAND	K68 L19 L33 M19 M25 M29 N59 N115 P32 P33 P41
NIGERIA	N51
NORWAY	J41 P45
SOUTH AFRICA	N129
SWEDEN	N123
SWITZERLAND	N49
THAILAND	M37
UK	J4 J53 K48 M1 N9 N40 P18 P30
USA (civil)	too numerous to tabulate
WEST GERMANY	J32 K42 K47 K51 K60 L15 L20 M23 M26 M27 M30 M35 N85 N91 P21 P25 P26 P40

TABLE 5 (Continued)
LIST OF ACCIDENTS BY COUNTRY

PART 2. MILITARY AIRCRAFT

ROYAL AUSTRALIAN NAVY N70 N80 N88 N96 P36

BELGIAN AIR FORCE K99

CANADIAN FORCES J28 N63

JAPAN AIR SELF-DEFENCE FORCE P13

UK - ROYAL AIR FORCE P9

US ARMY J43 K45 K46 K50 K58 M33 N41 N42 N47 N50 N53 N61 N62
N64 N67 N72 N100 N101 N106 N113 N117 O6 P15 P23 P31 P34

US COAST GUARD J40

US NAVY or US MARINE CORPS J30 P29

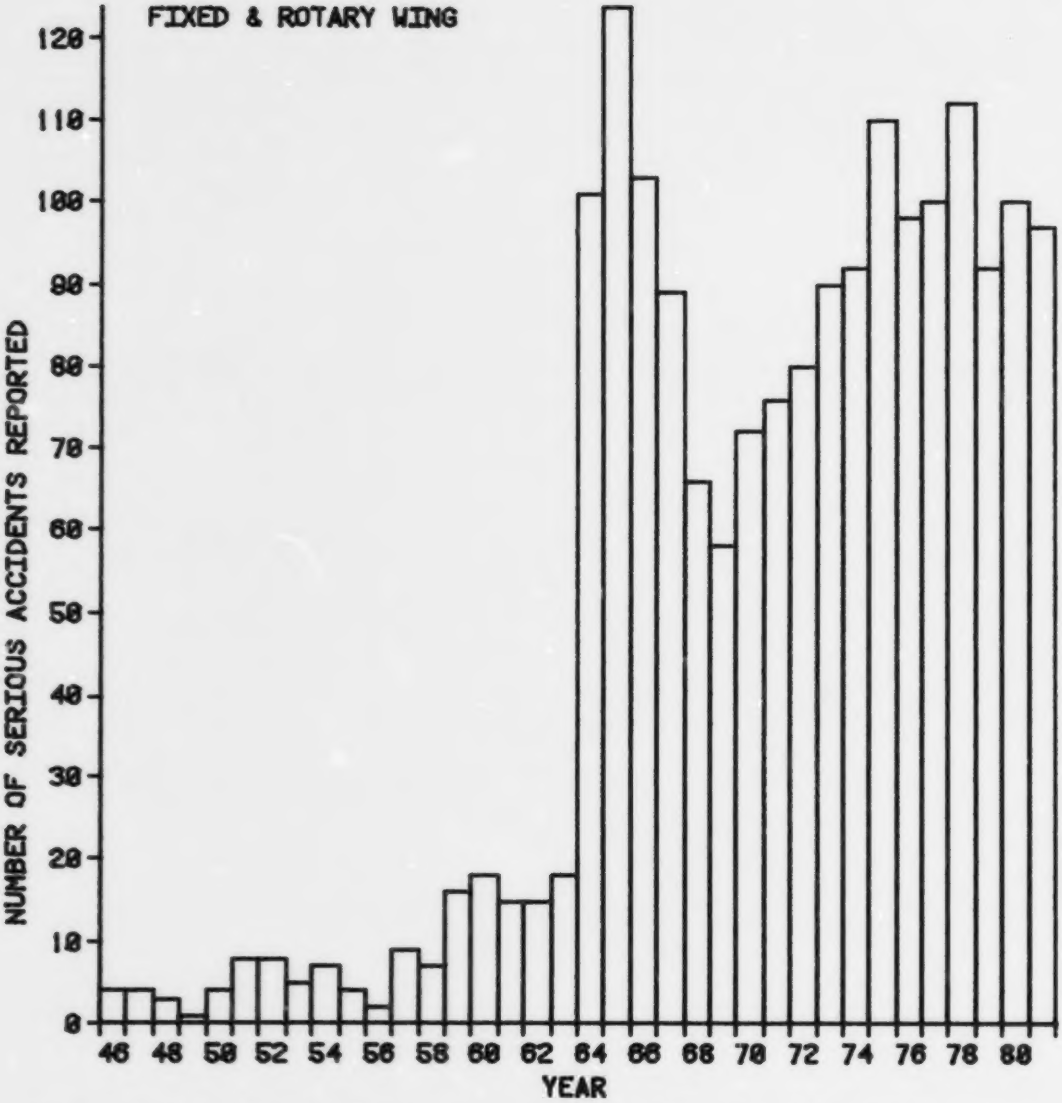

FIG. 1 NUMBER OF SERIOUS FATIGUE ACCIDENTS
- FIXED-WING & ROTARY-WING

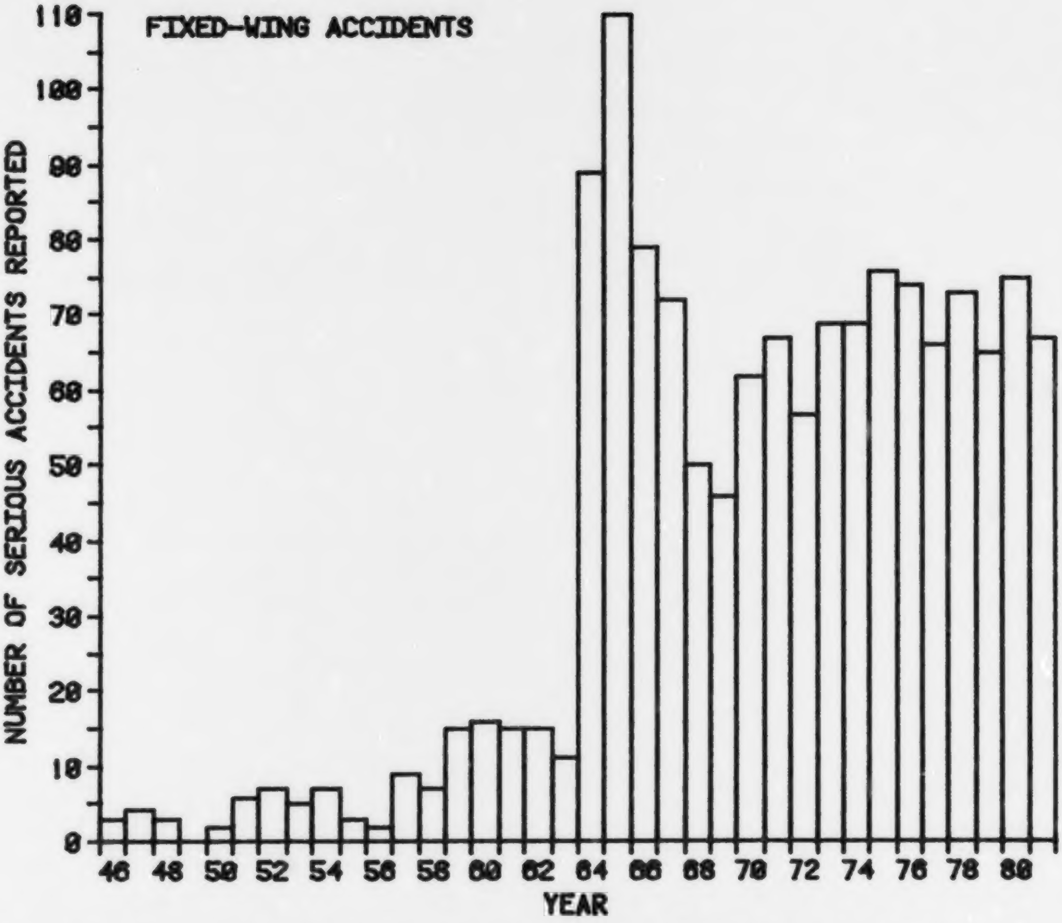

FIG. 2 NUMBER OF SERIOUS AIRCRAFT ACCIDENTS
- FIXED-WING

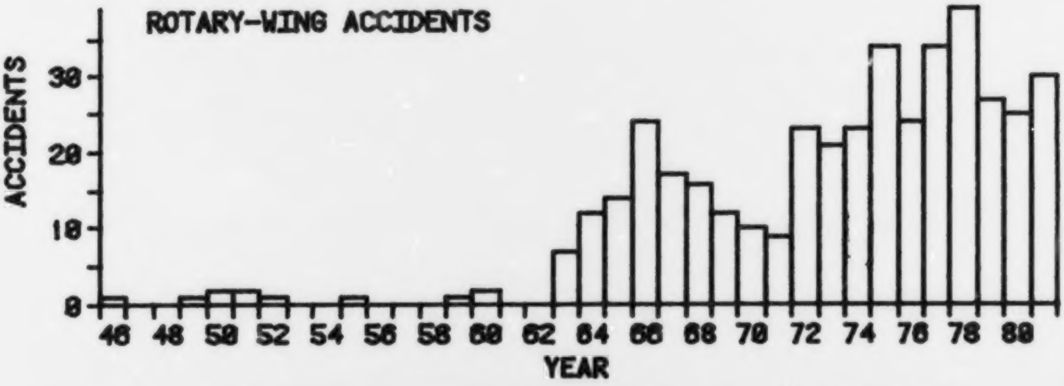

FIG. 3 NUMBER OF SERIOUS AIRCRAFT ACCIDENTS
- ROTARY-WING

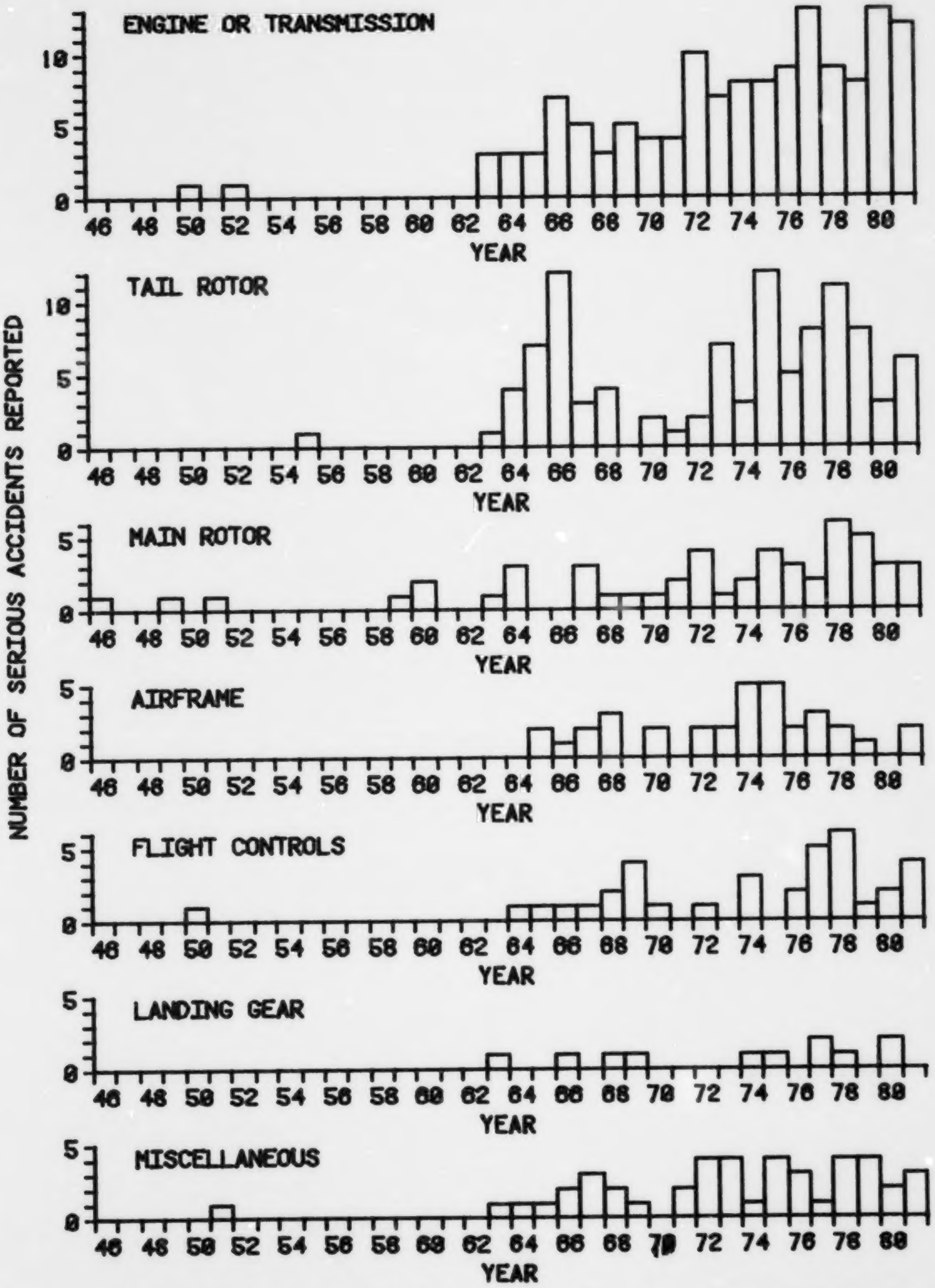

FIG. 4 CAUSES OF FATIGUE FAILURES - ROTARY-WING AIRCRAFT

PART I
LISTING BY FAILURE TYPE

APPENDIX J

ROTARY-WING - MAIN ROTOR SYSTEM

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
J1	autogyro (USAF)	1937	0	D	USA. Main rotor blade at outboard pin hole of hub attachment. Ref: Sines, "METAL FATIGUE", pp 363-364.
J2	Type unknown (US helicopter)	1940-51	1?	?	USA. Main rotor link at lower lug. Origin: inside of hole at point where bushing ended. Ref: Bennett & Quick, NBS Circular 550, p 20.
J3	Type unknown (helicopter)	3 Apr 46	?	D	USA? Certified helicopter with less than 100 hours total time crashed. Failure of rotor hub. Ref: Dogherty & Spicer, "Helicopter Fatigue Substantiation Procedures for Civil Aircraft", ASTM STP 338, 1963.
J4	Fairey Aviation FB-1 Gyrodyne	17 Apr 49	2	D	Great Britain. Rotor hub. UK's 1st fatal helicopter crash. Ref: p 239, "A Century Journal". Royal Aeronautical Society 1866-1966".
J5	Sikorsky S-51 (Los Angeles Airways)	27 Aug 51	1	?	Lynwood, Calif. USA. Fatigue failure of flapping hinge of main rotor hub caused separation of blade. Ref: AW Jan. 14/52, p 13
J6	Vertol 44B (New York Airways)	12 May 59	0	S	New York, N.Y. USA. Tuning weight strap in forward rotor blade. Ref: WHAS p. 2.
J7	Sikorsky S-58C (Chicago Airways)	27 Jul 60	13	D	Forest Park, Ill. USA. Main rotor blade. Origin: lower external backwall radius of spar. Ref: ICAO AAD #12, 1963, p 221.
J8	Bell 47G-2	27 Aug 60	0	D	Tremble Lake, Ont. Canada. Main rotor blade grip at barrel of grip (thread). Damaged in previous accident. Ref: MoT Canada file 1100.

J9	Vertol 42A H-21B Work Horse	17 Oct 63	0	S	Brass Radio Station, Que. Canada. Rear green main rotor blade at tubular spar 3 feet outboard of rotor head. (Corrosion pits). Ref: MoT Canada file 2128.
J10	Bensen B-8M Gyro-Copter	19 Jun 64	1	D	Nacogdoches, Tex. USA. Spindle holding main rotor to mast. Ref: NTSB file 2-1006
J11	Bell 47J-2	29 Jun 64	0	S	Waltham, Mass. USA. Main rotor mast control stabilizer bar. Ref: NTSB file 2-0699.
J12	Hughes 269A	14 Oct 64	2	D	Houston, Texas USA. Main rotor. Lack of lubrication in bearings. Ref: NTSB file 2-0974
J13	Bensen B-8M Gyro-Copter	28 Jan 67	1	D	Chino, Calif. USA. Main rotor separated in flight. Rotor spindle not made to specifications. NTSB file 2-0030
J14	Brantly 305	29 May 67	2	D	Chamblee, Ga. USA. Brinelled main-rotor hub clevis bearings caused torsion strap assembly to fail in fatigue, & main rotor separated. Ref: NTSB file 2-1188
J15	Brantly 305	3 Nov 67	3	D	Taswell, Ind. USA. Main rotor clevis bearings seized, main rotor torsion straps failed, causing main rotor to separate. Ref: NTSB file 2-1092
J16	Sikorsky S-61L (Los Angeles Airways)	14 Aug 68	21	D	Compton Calif. USA. Failure of shank of yellow main rotor blade spindle, causing separation of blade. Material: 4340 steel. Ref: NTSB file 1-0016
J17	Hiller FH-1100	15 Nov 69	0	S	Nordegg, Alta. Canada. Lower tine of main rotor blade cuff, at blade retention bolt hole (fretting). Undertorquing of main rotor retention bolt. Ref: MoT Canada file 5002-4637.
J18	Sikorsky CH/HH-53	late 1960s to 1980	?	?	? Spar of main rotor blade. Ref: AWST 29 Sept/80 p 85; OTTAWA CITIZEN, Dec 12/80, p 97.
J19	Sikorsky CH/HH-53	late 1960s to 1980	?	?	? Spar of main rotor blade. Ref: AWST 29 Sept/80 p 85; OTTAWA CITIZEN, Dec 12/80, p 97.
J20	Bell 47G-2	7 Apr 70	0	S	Timmins, Ont. Canada. Main rotor blade drag brace clevis. (Corrosion fatigue). Threads. Ref: MoT Canada file 00020.

J21	Bell 47G-2	8 Jun 71	1	D	Branchville, N.J., USA. Main rotor blade & grip assembly separated in flight. Improper grip for Bell 47G-2. Role: aerial application. NTSB file 3-1465
J22	Bell 47G-3B	8 Sep 71	0	S	Brentwood, Cal. USA. Main rotor stabilizer bar. NTSB file 3-3250.
J23	Bell 47G-2	20 Mar 72	0	S	Fremont, Iowa. USA. Main rotor blade grip. NTSB file 3-0475.
J24	Boeing Vertol CH-47A Chinook (US Army)	10 May 72	34	D	Vn. USA. Aft green main rotor blade (spar). Ref: US Army.
J25	Bell 206B	10 Aug 72	4	S	Embar, Labrador, Canada. Main rotor-blade retention strap fitting. Ref: MoT Canada file A20018
J26	Brantly B-2B	15 Aug 72	2	D	Duxbury, Mass. USA. Red main rotor blade separated in flight. Ref: NTSB file 3-1189
J27	Bell AH-1G HueyCobra (US Army)	26 Nov 73	2	D	Ok. USA. Main rotor blade assembly. Ref: US Army.
J28	Boeing Vertol CH 113A Voyageur (Canadian Forces)	20 Mar 74	3	D	Edmonton, Alta. Canada. Forward red rotor blade. Origin: corrosion pit on main D spar at mid-chord. Ref: CFAIRS.
J29	Sikorsky S-61N (KLM Noordzee)	10 May 74	6	D	North Sea, 110 nm n. of Texel, Netherlands. Separation of no. 3 main rotor blade. Origin: corrosion at bottom of spar. Ref: Netherlands Dept. of Civil Aviation.
J30	Sikorsky CH-53D Sea Stallion (US Marines)	8 Jan 75	4	?	Salisbury, Md. USA. Main rotor blade. Ref: OTTAWA CITIZEN, 11 Dec. 1980.
J31	Bell 206A	1 Feb 75	1	D	Milford, Connecticut, USA. Main rotor separated in flight. Lower main rotor pitch-change mechanism clevis. Ref: NTSB file 3-0335
J32	Bell 206A	23 Oct 75	4	D	Hiddensen, West Germany. Main rotor blade. Ref: West German file 3X0474.
J33	Bell 212	3 Nov 75	9	D	Gulf of Mexico, near Louisiana USA. Main rotor blades separated. NTSB file 3-4119.
J34	Bell 206B	17 Apr 76	1	D	Leeville, La. USA. Main rotor tension-torsion strap failed, causing rotor failure. Ref NTSB file 3-3102

J35	Air & Space 18-A	16 Feb 76	0	S	Baton Rouge, La. USA. Main rotor blade drag strut link. Ref: NTSB file 3-0171.
J36	Bell 206B	11 Dec 76	0	S	Morgan City, La. USA. Main rotor tension torsion strap separated. NTSB file 3-3870.
J37	Bell 206B	18 Feb 77	0	S	Atlanta, Ga. USA. Main rotor trunnion separated. NTSB file 3-0710.
J38	Bell 206B	17 Mar 77	1	D	Intracoastal City, La. USA. Main rotor tension-torsion strap. Ref: NTSB file 3-4230
J39	Bell 47G-4A	23 Mar 78	2	D	Morgan City, La. USA. Main rotor failure. Rotor blade counter-weight rod tie-bolt failed. Ref: NTSB file 3-0795
J40	Sikorsky S-61R (US Coast Guard)	May 78	?	?	USA Main rotor blade separated. Origin: fault in plating of spindle lug bore. Ref: AWST Aug 7/78 p 24, FI 24 Mar/79 p 888, & HELICOPTER INTERNATIONAL Dec/79-Jan/80 p 90.
J41	Sikorsky S-61N (Helikopter Service)	26 Jun 78	18	D	North Sea, off Norway. Lost a main rotor blade. Failure of rear lug on no 5 main rotor blade spindle. Ref: Norwegian Civil Aviation Administration
J42	Sikorsky S-76A	28 Jul 78	0	S	W. Palm Beach, Fla. USA. Main rotor failure (quill shaft). Ref: NTSB file 3-2896.
J43	Bell OH-58A Kiowa (US Army)	25 Aug 78	3	D	Germany. Main rotor blade assembly. Ref: US Army.
J44	Sikorsky S-58ET	1 Oct 78	1	D	Steamboat Springs, Colo. USA. Main rotor hinge pin. Ref: NTSB file 3-3296.
J45	Hiller UH-12E	11 May 79	0	S	Independence, Ore. USA. Main rotor failed. Incidence push rod end bearing failed at outer shell. NTSB file 3-1767
J46	Bell 47G-2	2 Aug 79	0	D	Neufchateau, Belgium. Clevis of one drag brace of main rotor blade. Ref: Belgium AA.
J47	Hiller UH-12E	10 Aug 79	0	S	Tuscalcosa, Al. USA. Pin, main rotor, outboard, tension torsion bar. Ref: NTSB file 3-3708.

J48	Bell 47G-2	24 Aug 79	0	S	Niagara Falls, Ont. Canada. Main rotor drag brace fitting. Ref: MoT Canada file 090106.
J49	Sikorsky CH-54A Tarhe (US Army)	29 Sep 79	4	D	Oh. USA. Main rotor separated (horizontal pin). Ref: US Army.
J50	Bell 206L	9 Jan 80	0	S	Opinaca, Que. Canada. Main rotor trunnion. Origin: spindle fillet. Lack of tempering during manufacture. Ref: MoT Canada file 80-Q00002.
J51	Sikorsky S-76A (VOTEC)	20 Mar 80	14	D	Off the Brazil coast. Inboard spindle bearing became displaced, causing fracture of main rotor head spindle (thread at spline inboard end). Ref: AWST May 5/80, p 23; HELICOPTER INTL., June-July/80 p 21
J52	Bell 47G-2A	3 Sep 80	2	D	Cottonport, La. USA. Main rotor failure. Cyclic-pitch lateral torque tube pivot shaft failed. Ref: NTSB file 3-2504
J53	Sikorsky S-76A (Bristow Helicopters)	13 Mar 81	4	D	North Sea, Aberdeen, Scotland. Excessive wear on Teflon-impregnated outer bearing caused main rotor spindle to crack at inboard end. Ref: AWST 23 Mar/81 p 26; & FI 2 May 81 p 1223
J54	Bell 47G-5	12 Jun 81	0	S	Coloma, Wi. USA. Main rotor separated. Corrosion and fatigue fracture of stabilizer bar assembly. Ref: NTSB file 3-1340.
J55	Robinson R22	Fall 81	?	?	Ellington, Conn. USA. Failure of A161 rotor fitting. Ref: ROTOR & WING INTL., Jan. 82 p 62

Total Fatalities: 167

APPENDIX K

ROTARY-WING - TAIL ROTOR

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
K1	Bell 47B	2 Jun 55	2	D	Chapleau, Ont. Canada. Tail rotor hub. Origin: bottom of inboard undercut radius of spindle. Blade, blade grip & spindle separated. Cracks in copper plating. Ref: MOT Canada file 55-33.
K2	Bell 47G-2	4 Sep 63	0	S	Stewart, B.C. Canada. Tail rotor blade at thrust side of bore of blade hub. Ref: MOT Canada file 2107.
K3	Hughes 269A	9 Feb 64	0	S	Opa Locka, Fla. USA Tail rotor blades. Ref: NTSB file 2-0032
K4	Bell 47G	3 May 64	0	D	McFarlane Lake, Ont. Canada. Tail rotor blade grip. Ref: MOT Canada file 2233.
K5	Bell 47G	27 Jul 64	0	S	Plymouth, Mass. USA. Tail rotor blade. Ref: NTSB file 2-0609
K6	Bell 47J-2	7 Dec 64	3	D	Venice, La. USA. Separation of tail rotor blade, blade grip. Ref: NTSB file 2-0990
K7	Bell 47J-2	28 Mar 65	1	D	Boston, Mass. USA. Tail rotor blade at blade grip. Ref: NTSB file 2-0282
K8	Agusta-Bell 47J	6 Jun 65	3	?	Helsinki, Finland. Tail rotor separated. Fracture in groove on thrust-bearing seat of blade grip. Ref: Finland National Board of Aviation.
K9	Brantly B-2	28 Jun 65	0	S	Prophetstown, Ill. USA. Tail rotor blades (unapproved mod). Ref: NTSB file 2-0638.
K10	Enstrom F-28	11 Jul 65	0	S	Marquette, Mich. USA. Tail rotor blades. Ref: NTSB file 2-0496
K11	Brantly 305	23 Aug 65	0	S	Millheim, Pa. USA. Tail rotor blades. Ref: NTSB file 2-0640
K12	Bell 47G-2	23 Nov 65	0	S	Kelso, Wash. USA. Tail rotor blade inside grip fitting in stress relief fillet. Ref: NTSB file 2-1079.

TAIL ROTOR (ROTARY-WING)

K13	Bell 47J-2	9 Dec 65	0	S	Refugio, Tex. USA. Tail rotor pinion shaft (improper assembly). Herding cattle. Ref: NTSB file 2-1005
K14	Bell 47J-2	14 Jan 66	0	S	East Boston, Mass. USA. Tail rotor blade inside grip fitting in stress relief fillet. Ref: NTSB file 2-0291.
K15	Bell 47G-4	31 Jan 66	0	S	Burbank, Cal. USA. Tail rotor blade. Ref: NTSB file 2-0351.
K16	Bell 47G-2	10 Feb 66	3	?	Sydney, Australia. Tail rotor retention bolt. Ref: Australia DoT.
K17	Bell 47G-2	19 Feb 66	0	S	Gold Hill, N.C. USA. Tail rotor blade in grip fitting stress relief fillet. Ref: NTSB file 2-0438.
K18	Bell 47G-3B-1	20 Mar 66	0	S	Fredericksted, Vi. USA. Tail rotor blade inside grip fitting in stress relief fillet. Ref: NTSB file 2-0439
K19	Bell 47G-3B	20 Jul 66	0	S	Santa Ana, Cal. USA. Tail rotor blade. Ref: NTSB file 2-0672
K20	Hiller UH-12E	22 Jul 66	2	D	Cochrane, Ontario, Canada. Tail-rotor spar. Origin: lower outboard trunnion attachment bolt hole. Ref: Canada MoT
K21	Bell 204B	8 Oct 66	11	D	Morgan City, La. USA. Tail rotor. NTSB file 2-1140
K22	Bell 47D-1	11 Oct 66	0	S	Ellensburg, Wash. USA. Tail rotor hub retention bolt. NTSB file 2-1001
K23	Bell 47G	12 Oct 66	0	S	Tonasket, Wash. USA. Tail rotor hub assembly bolt. NTSB file 2-1029.
K24	Hiller UH-12C	2 Nov 66	0	S	Mineral Wells, Tex. USA. Tail rotor hub. Ref: NTSB file 2-1014
K25	Bell 47J-2	7 Nov 66	4	D	Carpenter, Calif. USA. Tail rotor blade. Ref: NTSB file 2-1170
K26	Hiller UH-12E	2 Sep 67	2	D	Near Ft. Nelson, B.C. Canada. Tail-rotor spar tube. Origin: fretting corrosion. Ref: MoT file 3623.
K27	Bell 47G-4	13 Sep 67	2	S	La Place, La. USA. Shell of tail rotor blade. NTSB file 2-1036.
K28	Bell 47J-2A	13 Dec 67	2	D	Hanalei, Hawaii, USA. Tail rotor blade. Lack of bonding material between shell and grip. Ref: NTSB file 2-1121

K29	Bell 47G-4A	3 Jan 68	0	D	Los Angeles, Calif. USA. Tail rotor blade. Role: police patrol. Ref: NTSB file 3-0657.
K30	Brantly B-2B	6 Feb 68	2	D	Lakeside Nebr. USA. Tail-rotor blade spar, inside bearing boss radius. Ref: NTSB file 3-1563
K31	Enstrom F-28	10 May 68	0	S	Milwaukee, Wis. USA. Rotor spindle of tail rotor. NTSB file 3-2337.
K32	Bell 47G-4A	26 Oct 68	0	S	Chicago, Ill. USA. Tail rotor blades. Ref: NTSB file 3-4203
K33	Bell 47J-2	10 Jan 70	2	D	Fairbanks, Alaska USA. Tail rotor blades separated. NTSB file 3-0839.
K34	Bell 47G-2	14 Aug 70	0	S	Panama City, Fla. USA. Tail rotor blade retaining bolt. Ref: NTSB file 3-3191.
K35	Brantly B-2	12 Jun 71	0	S	Middleton, N.S. Canada. Tail rotor blade. Origin: inner wall surface of grip at thrust bearing shoulder relief radius (tool mark). Ref: MOT Canada file A1007.
K36	Bell 205A-1	29 May 72	11	D	Dulac, La. USA. Tail rotor blade grips failed. NTSB file 3-0659
K37	Bell 47G-3B-1	30 Aug 72	1	D	Tuba City, Ariz. USA. Tail rotor blades. Origin: internal bearing shoulder. Ref: NTSB file 3-3336
K38	Brantly 305	23 May 73	0	S	Denver, Colo. USA. Tail rotor hub. Ref: NTSB file 3-4173.
K39	Bell 47D	7 Jul 73	0	S	Anacortes, Wash. USA. Tail rotor blade yoke. Ref: NTSB file 3-2998.
K40	Bell 47G-5	8 Jul 73	0	S	Albuquerque, N. Mex. USA. Fracture of tail rotor blade. Previous damage to tail rotor pitch control system (75% of wires, cable #1, damaged by wear). NTSB file 3-2590.
K41	Kawasaki KH-4	14 Jul 73	0	D	Chiba Pref., Japan. Rear edge fitting on parts of tail rotor blade. Ref: Japan MoT.
K42	Agusta 47G-2	8 Sep 73	2	D	Solingen, West Germany. Separation of tail rotor, failure of bolt. Allowable flight time on blade exceeded. Ref: West German file 3X0423.

K43	Bell 47G-2	18 Sep 73	0	S	Viola, Ark. USA. Tail rotor blade (blade grip area). Ref: NTSB file 3-3346.
K44	Bell 47G-5	4 Oct 73	0	S	Fresno, Cal. USA. Tail rotor blade. Ref: NTSB file 3-3930.
K45	Bell UH-1H Iroquois (US Army)	23 Jul 74	0	S	Mo. USA. Tail rotor grip. Ref: US Army.
K46	Bell UH-1H Iroquois (US Army)	19 Aug 74	0	S	Fl. USA. Tail rotor at blade grip. Ref: US Army.
K47	Bell 47G-2	21 Oct 74	1	D	Hullern, West Germany. Separation of tail rotor due to fracture at blade root. Initiated by corrosion. Ref: W. German file 3X0454.
K48	Hughes 269C	15 Jan 75	2	D	Barnby Moor, Notts., England. Tail rotor spar (corrosion pit). Ref: FI 8 May/76 p. 1235.
K49	Hughes 369HS	20 Feb 75	0	S	Grand Chenier, La. USA. Tail rotor blade. NTSB file 3-1743.
K50	Bell UH-1H Iroquois (US Army)	13 May 75	0	S	In. USA. Tail rotor (stiffener spar). Ref: US Army.
K51	Agusta 47G-2	20 May 75	0	D	Feldkirchen, W. Germany. Tail rotor blade yoke. Ref: W. German file 3X0136.
K52	Bell 47H-1	20 May 75	0	S	Nashville, Tenn. USA. Tail rotor hub bolt. 499.8 hours on bolt (retirement life: 600 hours). NTSB file 3-2734.
K53	Bell 47G-2	26 May 75	0	S	Denmark, Ar. USA. Yoke tail rotor hub. Ref: NTSB file 3-1381.
K54	Bell 47G-2	2 Jul 75	1	D	Napa, Calif. USA. Improperly-machined tail rotor hub failed, blade separated from rotor yoke. Role: crop dusting. Ref: NTSB file 3-0266
K55	Bell 47G-2A	20 Jul 75	0	S	Freer, Tex. USA. Tail rotor blade. Ref: NTSB file 3-2431.
K56	Brantly B-305	31 Jul 75	0	D	100 km from Reykjavik, Iceland. Tail rotor (blade hub). Possibly improper installation. Ref: Iceland.
K57	Bell 47G-5	10 Aug 75	0	S	Chandler, Ariz. USA. Tail rotor blade. Ref: NTSB file 3-2127.

K58	Bell UH-1H Iroquois (US Army)	22 Aug 75	0	D	Ky. USA. Tail rotor grip assembly. Ref: US Army.
K59	Bell 47G-2	26 Aug 75	0	S	Elliott, S.C. USA. Tail rotor grip. Ref: NTSB file 3-4165.
K60	Bell 47G-2	21 Jan 76	0	D	Bad Friedrichsh. W. Germany. Tail rotor yoke. Ref: W. German file 3X0007.
K61	Enstrom F-28A	4 Apr 76	0	S	Blythe, Cal. USA. Tail rotor blade. Ref: NTSB file 3-1699.
K62	Bell 47G-3B-1	17 Jul 76	2	D	Petersburg Arkansas, USA. Tail rotor separated. Rotor blades 22 hours past mandatory change time. Ref: NTSB file 3-3890
K63	Enstrom F-28A	9 Aug 76	2	D	Enon, Ohio USA. Tail rotor blades separated. Spindle machined below specifications, and tool marks in machined area. NTSB file 3-4077
K64	Bell 47G-2	6 Nov 76	1	D	Pigeon Forge, Tenn. USA. Tail rotor blade. Ref: NTSB file 3-3404
K65	Bell 47G-2	1977	0	S	Bullo River, NT, Australia. Blade thrust bearing & blade grip failure. Prior damage to bearing. Ref: Australia DoT.
K66	Enstrom F-28C	8 Jan 77	0	S	Fallentimber, Pa. USA. Tail rotor spindle. Ref: NTSB file 3-2150.
K67	Bell 47D	29 Apr 77	0	S	Pori, Finland. Tail rotor blade. Ref: Finland BoA.
K68	Hiller UH-12E	6 May 77	0	S	Camerons Creek, New Zealand. Cuff (cuff & trunnion assembly of tail rotor) at bolt hole. Ref: NZ brief 77-071.
K69	Bell 47G-5A	6 May 77	0	D	Russiaville, In. USA. Tail rotor blade. Role: aerial application. Ref: NTSB file 3-3990
K70	Bell 47G-2	14 Jun 77	0	S	Santa Monica, Cal. USA. Tail rotor, yoke rotor hub in tail rotor gear box. Ref: NTSB file 3-2986.
K71	Hughes 369H	25 Jul 77	0	D	Hiroshima Pref. Japan. Tail rotor hub failed (maraging steel). Origin: pitting corrosion. Ref: Japan MoT
K72	Enstrom F-28	31 Jul 77	0	S	Montgomery, Ala. USA. Reversed installation of bearing in tail rotor pitch control system caused tail rotor failure. Ref: NTSB file 3-2386.

K73	Hiller UH-12E	1978	0	D	Wyndham, Australia. Tail rotor blade separated. Ref: Australia DoT
K74	Hughes 269B	10 Feb 78	0	D	Tahola, Wa. USA. Tail rotor swashplate assembly at threads. Ref: Ref: NTSB file 3-0349.
K75	Bell 47G-1	18 Feb 78	0	S	Buttonwillow, Cal. USA. Yoke tail rotor hub. Ref: NTSB file 3-0214.
K76	Brantly B-2B	14 Jul 78	1	S	Nome, Alaska USA. Tail rotor blade at radius inboard of thrust bearing shoulder. Role: herding animals. Ref: NTSB file 3-4406.
K77	Bell 47G	15 Jul 78	1	D	Loughman, Florida USA. Tail rotor blade. Time on blade: 77.5 hours. Role: crop dusting. Ref: NTSB file 3-4193 & Safety Recommendations A-80-30 & -31.
K78	Bell 47G-2	16 Jul 78	0	S	Pigeon Forge, Tenn. USA. Tail rotor blade grip. Ref: NTSB file 3-3357.
K79	Bell 47G-2	12 Aug 78	0	S	Soledad, Cal. USA. Tail rotor blade at insert on shank. Ref: NTSB file 3-2427.
K80	Bell 47G-2	12 Aug 78	1	D	Omega, Georgia USA. Tail rotor blades. Role: crop spraying. Ref: NTSB file 3-4257
K81	Hughes 369D	14 Aug 78	0	D	Cascadia, Oregon USA. Tail rotor hinge bearings worn. Vibration allowed tail rotor hub to fail. Role: logging. Ref: NTSB file 3-4204
K82	Bell 214	11 Nov 78	1	D	Col de M rie Blan, France. Tail rotor with its rear transmission box separated. Vibration caused by flapping of tail rotor as a result of abnormal wear of a universal joint. 3 fastening bolts on tail rotor broke in fatigue. Ref: WAHS p 26
K83	Brantly B-2B	15 Dec 78	2	D	Sloan, Iowa USA. Tail rotor blade. NTSB file 3-4376
K84	Rotorway Scorpion Too	27 Mar 79	1	S	Johns Island, S. Carolina, USA. Tail rotor blades separated. NTSB file 3-2385.
K85	Sikorsky S-58ET	16 Mar 79	0	D	Nova Vicosa, Brazil. Tail rotor blade. Ref: Brazil.
K86	Sikorsky S-61L (N.Y. Airways)	18 Apr 79	3	D	Newark, N.J. USA. Tail rotor blade separated. Crack in leading-edge spar. Ref: NTSB file 1-0013 & NTSB-AAR-79-14.

K87	Bell 47D	8 Jun 79	0	S	Parchman, Miss. USA. Tail rotor blade. NTSB file 3-1957.
K88	Bell 47G-2	17 Jun 79	2	D	Jundah, Qld. Australia. Tail rotor blade grip at relief radius of outer bearing. Ref: Australia DoT
K89	Bell 206B	21 Jul 79	0	S	Alpine, N.J. USA. Fatigue fracture of tail rotor blade. ELT antenna separated due to fatigue. Tail rotor grooves match ELT antenna. NTSB file 3-3911.
K90	Bell 47G	30 Jul 79	0	S	St. Andrews, Man. Canada. Tail rotor at blade grip. Ref: MOT Canada file C90095.
K91	Bell 47J-2	14 Sep 79	5	D	Long Beach, Calif. USA. Tail rotor separated. Origin: inside diameter of blade grip. Ref: NTSB file 3-3068 & Safety Recommendations A-80-30 & -31.
K92	Bell 47G-2	8 Mar 80	0	D	Brentwood, Calif. USA. Tail rotor blade yoke. Role: spraying. Ref: NTSB file 3-3256.
K93	Tom Cat I	1 May 80	0	D	Watsonville, Ca. USA. Tail rotor blade. Blade was 632 hours beyond required removal time. Role: crop spraying. Ref: NTSB file 3-1634
K94	Bell 47D-1	22 Jul 80	0	S	Milan, Mi. USA. Tail rotor blade at outboard bearing relief radius of grip. NTSB file 3-2462
K95	Bell 47	1981	0	S	Stanthorpe, Queensland Australia. Tail rotor at blade grip. Ref: Australia DoT.
K96	Bell 47G-2	20 Feb 81	0	S	Abbotsford, B.C. Canada. Tail rotor blade grip. Service life 300 hours. Blade had been on 3 different helicopters for a total of 1308 hours. MOT Canada file P10011.
K97	Aerospatiale AS 350 Astar	27 Feb 81	0	S	St. Faustin, Que. Canada. Tail rotor failure (tail rotor control fitting). Fitting not properly seated on tail rotor blade flange. Ref: MOT Canada file Q10010
K98	Hiller UH-12E	3 Apr 81	0	D	Miami, Fl. USA. Tail rotor blade failure. Bogus part. Blade composed of impure skin material, rivets installed incorrectly, & bal. screw not lock-wired. Ref: NTSB file 3-1902.
K99	Westland Sea King HAS Mk.1 (Belgian AF)	28 Apr 81	0	S	Oostende, Belgium. Lug of tail rotor blade fitting. Ref: Belgium AA.

TAIL ROTOR (ROTARY-WING)

K100	Brantly B-2B	10 Jun 81	2	D	Chesterton, In. USA. Tail rotor blade (blade shank outboard of double bearing location). Ref: NTSB file 3-1489

Total fatalities: 81

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*       APPENDIX L        *
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* ROTARY-WING - AIRFRAME *
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ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
L1	Hughes 269A	19 Aug 65	0	S	Miami, Fla. USA. Looseness of stabilizer lower attach bolt caused upper attach bolt to fatigue fail, stabilizer came off. Ref: NTSB file 2-0552.
L2	Sikorsky S-55	15 Oct 65	0	S	Fogo Village, Nfld. Canada. Tail rotor pylon lower attachment ring. (Magnesium alloy casting). Ref: MOT Canada file 2747.
L3	Hughes 269B	1 Mar 66	0	S	Memphis, Tenn. USA. Loose tail rotor abrasive strip caused vibration, failing improper rivets in stabilizer mount bracket. Ref: NTSB file 2-0358.
L4	Bell 47G	26 Jun 67	0	S	Lincoln, Kans. USA. Tail rotor assembly broke off tail boom due to failure of housing yoke. Ref: NTSB file 2-0889.
L5	Sikorsky S-52-3	28 Jun 67	0	S	Kingston, Jamaica. Tail rotor separated. Tail cone pylon tube separated at station 72. Ref: Jamaica.
L6	Bell 204B	22 Mar 68	3	?	Bass Strait, Australia. Tail fin structure (tail rotor imbalance). Trunnion thrust washer not installed during maintenance. Australian DoT
L7	Brantly B-2B	6 Jul 68	0	S	Monroeville, Pa. USA. Right stabilizer spar tube. NTSB file 3-2273.
L8	Sikorsky S-55	23 Jul 68	0	D	Marathon, Ont. Canada. Bolts attaching the tail rotor pylon assembly (threads). Ref: MOT Canada file 3982.
L9	Bell 47J	1970	0	S	Cook SA, Australia. Stabilizer tube assembly at inboard end. Severe fretting at inner & outer tubes. Ref: Australia
L10	Hughes 269B	27 Sep 70	1	D	Ste. Pie de Bagot, Que. Canada. Tailboom left support strut lower fitting (fretting). Misalignment during rebuild after previous accident. Ref: MOT Canada file Q0074.

L11	Sikorsky S-58ET	25 Mar 72	0	S	Darwin, Australia. Tail rotor assembly and gear box separated. Cracks in gear box mounting flange. Pylon fitting also had cracks. Ref: WHAS p. 10.
L12	Hughes 269B	11 May 72	0	S	Saratoga, N.Y. USA. Tail boom attach strut. Ref: NTSB file 3-0749.
L13	Sikorsky S-55	19 Sep 73	0	S	Duette, Fla. USA. Tail boom pylon ring. Ref: NTSB file 3-3903.
L14	Bell 47G-5	25 Oct 73	2	D	Waynesburg, Pa. USA. Tail boom separated at STA 70, poor weld repairing previous damage. NTSB file 3-3225
L15	Sud Aviation SA 318C Alouette II	22 Jan 74	0	S	Schaphusen, W. Germany. Stabilizer spar tube (prohibited weld repair). Ref: W. German file 3X0005.
L16	Hughes 269B	21 Feb 74	0	S	Saitama Pref., Japan. Cluster fitting of centre frame. Crack origin: pitting corrosion. Ref: Japan MoT.
L17	Hughes 269B	27 May 74	0	S	Las Vegas, Nev. USA. Horizontal stabilizer attachment. Ref: NTSB file 3-3804.
L18	Hiller FH-1100	24 Nov 74	1	D	Freeport, NY USA. Aft tail boom separated, cracks in tail fin spar channel. Role: police patrol. Ref: NTSB file 3-4332
L19	Hughes 269B	27 Nov 74	0	D	Omahaki Station, New Zealand. Attachment lug of port tailboom support strut. Ref: NZ brief 74-131.
L20	Sud Aviation SA 318B Alouette II	27 Feb 75	0	S	Oberpleis, W. Germany. Tubular spar of stabilizer. Ref: W. German file 3X0023.
L21	Enstrom F-28A	5 Jul 75	0	S	San Francisco, Cal. USA. Tail boom attach bolt. Ref: NTSB file 3-4031.
L22	Hughes 269B	15 Jul 75	0	D	Niigata Pref., Japan. Stress concentration at fitting metal and rivet of horizontal stabilizer. Ref: Japan MoT
L23	Hughes 269C	17 Sep 75	0	D	Rovaniemi Airport, Finland. Gear box to fuselage fastening strut broke, allowing rotor steering system to move freely. Ref: Finland BoA.
L24	Hughes 269A	14 Oct 75	0	S	Wichita, Kans. USA. Tail boom end fitting (surface scratch). Ref: NTSB file 3-3467.

L25 Bell 205A-1	23 Apr 76	12	D	Gulf of Mexico near Louisiana USA. Tail boom/fuselage attach fittings. Ref: NTSB file 3-2324
L26 Bell 47K	22 May 76	0	D	Greenwich, R.I. USA. Right elevator tubular spar. Elevator struck tail rotor. NTSB file 3-0999
L27 Bell 204B	11 Feb 77	0	D	Shizuoka Pref., Japan. Fitting flange of vertical fin. Ref: Japan MoT
L28 Hughes 269B	30 May 77	0	S	Evart, Mich. USA. Tail boom center attach fitting. Ref: NTSB file 3-3150.
L29 Bell 214B-1	31 May 77	2	D	Liberty, Wash. USA. Separation of vertical fin. Ref: NTSB file 3-1607
L30 Sikorsky S-55	15 Aug 78	0	S	Carver, Ma. USA. Attach bolts of vertical pylon of tail boom. Ref: NTSB file 3-3733.
L31 Sikorsky S-55	6 Nov 78	0	S	Quesnel, B.C. Canada. Tail rotor pylon assembly. Fretting fatigue pre-cracking of assembly in area of tail cone ring. Ref: ICAO ADREP 2042/78
L32 Hughes 269C	15 Dec 79	1	D	West Milton, Ohio, USA. Tailboom centre attach fitting. NTSB file 3-3423
L33 Aerospatiale SA 315B Lama	5 Apr 81	0	S	Kawakawa Bay, New Zealand. Top right tailboom longeron at bushing attaching tailplane. Poor weld repairing previous damage. Ref: NZ brief 81-040.
L34 Hughes 269A	29 Aug 81	0	S	Campbell River, B.C. Canada. Tailboom separated at tailboom centre support fitting (rivet head fretting). Ref: MOT Canada file P10090.
L35 Bell 222	16 Apr 82	3	D	Hinton, Ok. USA. Main rotor blade control link. Ref: HELICOPTER INTERNATIONAL, Jul-Aug/82 pp 31-32.

Total Fatalities: 25

APPENDIX M

ROTARY WING - FLIGHT CONTROLS

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
M1	Cierva Air Horse	13 Jun 50	3	?	England. Carrier driving link of front rotor. Ref: THE AEROPLANE, July 5/50 p. 5
M2	Bell 47G-2	11 Jul 64	0	S	Wall, S.D. USA. Tail rotor pitch control system. NTSB file 2-0317
M3	Hiller UH-12E	7 Jul 65	0	D	Meeteetse, Wyo. USA. (Cyclic pitch control system). Bolt holding wobble plate pylon not properly secured, allowing plate to fail in fatigue. Role: aerial application. Ref: NTSB file 2-0491.
M4	Bensen B-8M Gyro-Copter	25 Sep 66	1	D	Benton, Pa. USA. Head fork assembly strap. NTSB file 2-0993
M5	Bell 47G-2	2 Dec 67	0	S	Lahabra, Cal. USA. Tail rotor pitch change link (improper installation). Tensile strength below manufacturer's requirements. Ref: NTSB file 2-1179.
M6	Sikorsky H-19G	1 Oct 68	0	S	Mandeville, La. USA. Tail rotor control rod bearing. Ref: NTSB file 3-4104
M7	Bell 47G-5	23 Nov 68	0	S	Rochester, Mass. USA. Failure of shaft to cylinder servo valve, cyclic pitch control system. Ref: NTSB file 3-4913.
M8	Bell 206A	15 Mar 69	0	D	Springfield, Ohio. USA. Right-hand cyclic bell-crank support. Ref: NTSB file 3-3060.
M9	Bell 206A	20 Jul 69	1	S	Mile 142 Alaska Highway, BC, Canada. Bearing connecting pitch link to swash-plate outer ring went out of position. Pitch link lower clevis contacted the swash plate horn, causing abnormal bending loads & fatigue failure of clevis. Ref: MoT Canada file 5002-4452.
M10	Fairchild Hiller FH-1100	21 Jul 69	1	?	Opapimiskan Lake, Ont. Canada. Swash-plate input push-rod assembly at rod-end retainer. Ref: MoT Canada.

M-2
FLIGHT CONTROLS (ROTARY-WING)

M11 Sikorsky S-64E	2 Sep 69	3	D	Prudhoe Bay, Alaska USA. Tail-rotor pitch-control link assembly. Ref: NTSB file 3-3686
M12 Bell 47G	5 Mar 70	0	S	Fort Worth, Tex. USA. Sheared delta hinge bolt caused failure of pitch control bearing & tail rotor separation. Ref: NTSB file 3-0548.
M13 Bell 47G-5	21 Jan 72	0	S	Koloa, Hawaii. USA. Cyclic-pitch control boost cylinder. Ref: NTSB file 3-0283.
M14 Hiller FH-1100	30 Jun 74	5	D	Umiat, Alaska USA. Swashplate assembly, cracks at two bolt holes. Ref: NTSB file 3-3039
M15 Bell 205A-1	21 Jul 74	0	D	Umiat, Alaska USA. Tail rotor pitch-change chain. Ref: NTSB file 3-4266.
M16 Bell 47G-3B-1	5 Sep 74	1	D	Ogden, Utah USA. Lost lateral cyclic control. Shaft separation due to off-centre drilled hole. Ref: NTSB file 3-3686
M17 Bell 47G-4A	10 Jan 76	0	S	Encinal, Tex. USA. Tail rotor pitch change link. NTSB file 3-0079
M18 Hiller UH-12E	14 Mar 76	0	D	Bluff, Ut. USA. (Cyclic pitch control system). Wobble plate pylon failed. Ref: NTSB file 3-0857.
M19 Hughes 269B	5 Feb 77	2	D	Cascade Creek, New Zealand. Upper scissors link support of main rotor. Possible installation of wrong thrust bearing. Ref: NZ AAR 77-023
M20 Aerospatiale SA 318 Alouette II	16 Jun 77	0	S	Hawkes Lake, Man. Canada. Tail rotor pitch change link. Ref: MoT Canada file C70080.
M21 Hiller 12EJ3	28 Jul 77	1	D	Ketchikan, Alaska USA Cyclic pitch control system failed. Cyclic isolation-link hollow-shank rod-end bearing had same ID no. as correct solid rod end. Role: aerial survey. Ref: NTSB file 3-4203
M22 Kawasaki KH-4	9 Aug 77	0	D	Ibaragi Pref., Japan. Origin: Pitting corrosion at support parts of torque tube assembly. Ref: Japan MoT.
M23 MBB BO 105	15 Dec 77	0	D	Kassel, W. Germany. Tail-rotor pitch control linkage, rotor control shaft fitting. Ref: W. German file 3X0569.

M24	Bell 47G-5	1978	0	S	Winton, Qld. Australia. Tail rotor pitch-change rod. Role: cattle mustering. Ref: Australia DoT.
M25	Hiller UH12E	19 May 78	0	S	Karamea, New Zealand. Left tail rotor control cable near pulley. Ref: NZ brief 78-075.
M26	Bell 47G-4	12 Jun 78	0	S	Bremm A.D. Mosel, W. Germany. Tail rotor pitch control system. Ref: W. German file 3X0188.
M27	Westland 47G-3	11 Jul 78	0	D	Wintringen, W. Germany. Tail rotor pitch control system (steering cable). Ref: W. German file 4X0034.
M28	Bell 205A-1	18 Aug 78	1	D	Dennison Mines, BC, Canada. Tail-rotor pitch-change chain. Ref: MoT Canada file P80085
M29	Hiller UH-12J	20 Nov 78	0	S	Between Arawhata & Waitoto Rivers, New Zealand. Main rotor control "paddles" separated. Origin: fretting at inboard bolt holes by trunnion bearing cuffs. Ref: NZ brief 78-151.
M30	Agusta 47J-3	11 Jun 79	0	S	Iphofen, W. Germany. Tail rotor pitch control system. Ref: W. German file 3X0207.
M31	Bell 47G-3B KH-4	11 Jun 80	0	D	Ibaragi Pref., Japan. Fitting bolt of forward & aft cyclic control rod. Ref: Japan MoT.
M32	Bell 47G-2A	3 Sep 80	2	D	Cottonport, La. USA. Lateral control torque tube pivot shaft of cyclic pitch control system. NTSB file 3-2504.
M33	Bell AH-1S HueyCobra (US Army)	23 Mar 81	0	D	Germany. Failure of tube assembly. Ref: US Army.
M34	Aerospatial AS 350D Astar	4 May 81	0	S	Gulf of Mexico. Tail rotor pitch horn. Ref: NTSB file 3-1183.
M35	Westland 47G-3B-1	4 Jul 81	0	S	Koldingen, W. Germany. Main rotor cyclic pitch control. Damper shaft in region of clamp. Ref: W. German file 3X0304.
M36	Bell 212	11 Sep 81	0	S	Wadlin Lake, Alta. Canada. "White" tail rotor pitch link. Premature wear of rod end bearing produced abnormal loading & fatigue initiation. Ref: MoT Canada file W10113

FLIGHT CONTROLS (ROTARY-WING)

M37	Sikorsky S-76	30 Apr 82	13 D	Krahisland, Thailand. Left tail rotor control cable fractured (improper rigging). Ref: ICAO ADREP 131/82.

Total Fatalities: 34

APPENDIX N

ROTARY-WING - ENGINE OR TRANSMISSION

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
N1	Bell 47D-1	15 Sep 50	0	S	Liege, Belgium. Blade of engine cooling fan. Ref: Belgium AA.
N2	Hiller 360	7 Feb 52	1	D	Toussus-le-Noble, France. Connecting rod in no. 2 cylinder. Ref: ICAO AAD No. 3 1953, p. 122
N3	Sikorsky S-58D	11 Jul 63	0	S	Larchwood, Ont. Canada. Threaded end of knuckle pin retaining bolt. Ref: MoT Canada file 2020.
N4	Bell 47G	14 Oct 63	0	S	Porcupine River, Que. Canada. Connecting rod bolts at thread. Ref: MoT Canada file 2138.
N5	Boeing Vertol 107-II (New York Airways)	14 Oct 63	6	D	Jamaica, N.Y USA. Quill drive shaft (contamination of lubrication system in aft transmission assembly). Ref: ICAO AAD No. 15, Vol. I, 1966, p. 116.
N6	Sikorsky S-55	4 Aug 64	0	S	Esker, Lab. Canada. No. 8 cylinder exhaust valve housing at rocker shaft small bushing boss. Ref: MoT Canada file 2336.
N7	Bell 47G	27 Sep 64	0	S	Bakersfield, Cal. USA. Exhaust rocker arm bolt, no. 3 cylinder. Ref: NTSB file 2-0779.
N8	Bell 47J-2	22 Dec 64	0	S	Philadelphia, Pa. USA. No. 1 cylinder connecting rod. NTSB file 2-0943.
N9	Hiller 360	6 Apr 65	0	S	Ludham, UK. No. 4 piston. Ref: UK BoT C.A.P. 265 p 49.
N10	Hughes 269A	21 Apr 65	0	D	Columbus, Ohio USA. Engine flywheel weight assembly. Ref: NTSB file 2-0858.
N11	Brantly B-2B	25 Sep 65	0	S	Denver, Colo. USA. Connecting rod cap bolt. Ref: NTSB file 2-0921.
N12	Hughes 269B	25 Feb 66	0	S	May Pen, Jamaica. Fuel feed pipe-line to No. 3 cylinder. Ref: Jamaica.

ENGINE/TRANSMISSION (ROTARY-WING)

N13	Bell 47D-1	12 Mar 66	0	S	Shelby, Miss. USA. No. 2 connecting rod. Ref: NTSB file 2-0324.
N14	Sikorsky S-55	22 Jun 66	0	S	Prince George, B.C. Canada. No. 1 cylinder exhaust rocker box casting. Ref: MoT Canada file 2985.
N15	Bell 47G-3B-1	16 Aug 66	0	S	Telegraph Creek, B.C. Canada. Fan blade (improper installation). Ref: MoT Canada file 3090.
N16	Hiller UH-12E	24 Aug 66	0	S	Rainbow Lake, Alta. Canada. No. 1 connecting rod (inadequate torquing). Ref: MoT Canada file 3101.
N17	Hiller UH-12E	11 Sep 66	0	S	Happy Camp, Cal. USA. No. 4 cylinder connecting rod bolt. Ref: NTSB file 2-1184.
N18	Bell 47J-2	26 Oct 66	0	S	Brookline, Mass. USA. Teeth in fan drive gears. Ref: NTSB file 2-1189
N19	Bell 47G-3B	4 Jan 67	0	S	Glenwood Springs, Colo. USA. Piston pin, no. 6 cylinder. NTSB file 2-0065.
N20	Hughes 269B	4 Feb 67	0	S	Culver City, Cal. USA. Attach fitting of clutch actuator electromechanical unit. No lubrication on pin or fitting. Ref: NTSB file 2-0632.
N21	Hughes 269B	13 May 67	0	S	Saluda, S.C. USA. Malfunction of main rotor gear drive assembly due to failure of huck bolts. NTSB file 2-0807.
N22	Hughes 269B	30 May 67	0	S	Lakewood, Cal. USA. Improper con rod bolts in no. 4 cylinder failed Ref: NTSB file 2-0656.
N23	Hughes 269A	12 Oct 67	0	S	Lula, Miss. USA. Lower coupling drive shaft. NTSB file 2-0930.
N24	Fairchild Hiller FH-1100	8 Jun 68	0	S	Fort Nelson, B.C. Canada. Forward diaphragm of centre disc on front end diaphragm pack of power transmission shaft. Ref: MoT Canada file 3915.
N25	Bell 47G-3B-1	24 Jun 68	0	S	Fuller Lake, Y.T. Canada. Wrist pin of piston, no. 1 cylinder. Ref: MoT Canada file 3944.
N26	Bell 206A	31 Aug 68	0	S	Medfra, Alas. USA. First stage compressor vanes. NTSB file 3-4899.
N27	Brantly B-2	30 Mar 69	0	D	Aberdeen, Md. USA. No. 4 piston connecting-rod attach bolt. Ref: NTSB file 3-0954.

N28	Hiller FH-1100	11 Jun 69	3	D	Niwelin Lake, NWT, Canada. Bendix engine-to-transmission driveshaft. Ref: MoT Canada file 5002-4412.
N29	Hiller UH-12E	9 Jul 69	0	S	Bettles, Alas. USA. No. 5 cylinder con rod cap and bolts. Ref: NTSB file 3-3527.
N30	Bell 47G-3B-1	23 Jul 69	0	S	Stirling City, Cal. USA. External supercharger (turbine wheel). Ref: NTSB file 3-3595.
N31	Hughes 269B	17 Aug 69	0	D	Lakewood, Calif. USA. Failure of electro-mechanical actuator in transmission rotor drive system created disconnect of power drive pulley belts to engine. Ref: NTSB file 3-2563.
N32	Hughes 269B	17 Mar 70	0	S	Santa Monica, Cal. USA. No. 4 cylinder connecting rod. NTSB file 3-4483.
N33	Bell 47J-2	22 Apr 70	0	S	Piscataway, N.J. USA. Free wheeling gear in main rotor drive system. Ref: NTSB file 3-0343.
N34	Bell 206A	25 Apr 70	0	S	Morgan City, La. USA. Blade of 2nd stage gas producer turbine wheel. Ref: NTSB file 3-1457.
N35	Bell 206A	21 May 70	0	S	Pennsauken, N.J. USA. Two 5th stage compressor blades. Ref: NTSB file 3-4596.
N36	Bell 206A	19 Jan 71	0	S	Lac Duprat, Que. Canada. Compressor rotor assembly's 3rd stage compressor blades (abnormal vibrations). Ref: MoT Canada file Q1002.
N37	Bell 206A	9 Jun 71	0	D	Gulf of Mexico off Louisianna, USA. 2nd phase turbine wheel. Ref: NTSB file 3-2158
N38	Bell 47G-4-A	10 Sep 71	0	S	Shelbyville, Ky. USA. Bolt to # 6 con rod. Ref: NTSB file 3-3249.
N39	Hughes 269C	3 Dec 71	0	S	Hallandale, Fla. USA. # 1 exhaust valve. Ref: NTSB file 3-3273.
N40	Hiller 360-UH	28 Feb 72	2	D	England. Failure of a planet gear in the first-stage reduction housing, causing main rotor to detach. Ref: UK AIB CAAR 13/73.
N41	Bell AH-1G HueyCobra (US Army)	1 Mar 72	0	S	Vn. USA. Engine (compressor blade). Ref: US Army

N42	Hughes OH-6A Cayuse (US Army)	15 May 72	0	D?	Vn. USA. Engine failure (band & vane assembly). Ref: US Army
N43	Hiller UH-12E	7 Jul 72	0	S	Umiat, Alas. USA. # 3 conrod and cap (fretting). NTSB file 3-1256
N44	Hiller FH-1100	19 Jul 72	0	S	North Bend, Wash. USA. 1 blade from each stage of 5th & 6th compressor wheel. Ref: NTSB file 3-3269.
N45	Bell 206A	2 Aug 72	0	S	Rocky Hill, Conn. USA. Compressor blade (overhaul overdue). Ref: NTSB file 3-1806.
N46	Aerospatiale Alouette III	8 Aug 72	0	S	Greybull, Wy. USA. Main drive shaft (faulty machining). Ref: NTSB file 3-1246.
N47	Hughes OH-6A Cayuse (US Army)	17 Sep 72	0	S	Vn. USA. Engine failure (compressor rotor). Ref: US Army
N48	Hughes 269C	19 Oct 72	0	S	Chamblee, Ga. USA. # 4 connecting rod bolt. Origin: surface damage. Ref: NTSB file 3-0854
N49	Bell 47G-3B-1	9 Nov 72	3	D	Piz Muttler, Switzerland. Cooling fan blade (fretting at bolt). Ref: Switzerland Accident Report 1972/82 837.
N50	Bell UH-1B (US Army)	18 Jan 73	0	S	Al. USA. Engine power shaft. Ref: US Army.
N51	Westland Whirlwind S-55	28 Feb 73	4	D	Eket, Nigeria. Failure in transmission/rotor drive main gearbox. Ref: ICAO ADREP 265/73
N52	Hughes 369HS	28 Mar 73	0	S	Point La Hache, La. USA. Compressor, spur adapter gear shaft. Ref: NTSB file 3-0838.
N53	Bell OH-58A Kiowa (US Army)	29 Mar 73	0	S	N.C. USA. Engine compressor rotor. Ref: US Army.
N54	Bell 47G-4A	5 Apr 73	0	S	Washington, D.C. USA. No. 6 cylinder conrod cap bolt. NTSB file 3-1877
N55	Hughes 269C	2 Oct 73	2	D	Oakland, Calif. USA. Main-rotor gear drive-shaft failed, main rotor separated. Ref: NTSB file 3-3942
N56	Hughes 269B	16 Oct 73	2	D	Springfield, Ohio USA. Lower-coupling drive shaft, tail-rotor drive-shaft assembly. Ref: NTSB file 3-3968

N57	Hughes 369H	1974	0	D	Derby W.A., Australia. Out-of-balance blade due to loss of abrasion tape caused gearbox separation (fatigue) at flange. Ref: Australia DoT.
N58	Bell 47G-3B-2	1974	0	S	Mt. Bundy Stn. Australia. Connecting rod bearing. Origin: galling on bearing borecon rod. Ref: Australia DoT.
N59	Hiller UH-12E	2 Feb 74	0	S	National Park, New Zealand. No. 6 cylinder con-rod bolt. NZ brief 74-016.
N60	Hughes 369HS	2 Apr 74	0	S	Petersburg, Alas. USA. 1st stage turbine wheel (thermal fatigue). Ref: NTSB file 3-3343.
N61	Bell OH-58A Kiowa (US Army)	9 Apr 74	0	S	Germany. Engine compressor rotor. Ref: US Army.
N62	Bell OH-58A Kiowa (US Army)	10 Sep 74	0	S	Ky. USA. Compressor rotor. Ref: US Army.
N63	Boeing Vertol CH 147 Chinook (Canadian Forces)	18 Oct 74	5	D	Middletown, Pa. USA. Combining transmission spiral bevel gear. Origin: non-metallic inclusion on gear flange. Ref: CF ACAIRS.
N64	Bell UH-1H Iroquois (US Army)	23 Oct 74	0	S	Tn. USA. Engine (blade). Ref: US Army.
N65	Enstrom F-28A	1975	0	S	Curlew Waterhole, Australia. RH front transmission bolt failed, resulting in failure of collective pitch control bellcrank. Ref: Australia DoT.
N66	Hughes 269B	19 Mar 75	0	S	Gail, Tex. USA. No. 4 conrod. Ref: NTSB file 3-2621.
N67	Boeing Vertol CH-47C Chinook (US Army)	13 Jun 75	0	D	Germany. Blade in engine. Ref: US Army.
N68	Bell 206A	30 Jul 75	0	S	Barter Island, Ak. USA. 5th stage compressor wheel blades. Ref: NTSB file 3-4016.
N69	Brantly B-305	29 Sep 75	0	D	Budir, Faskrudsfjordur, Iceland. Piston rod. Engine far above authorized lifetime. Ref: Iceland.
N70	Sikorsky Sea King 50 (RAN)	21 Oct 75	0	D	At sea off Nowra, Australia. Transmission oil filter retaining bolt. Ref: Royal Australian Navy.

N71	Bell 47J-2	22 Oct 75	0	S	Conshocken, Pa. USA. No. 5 connecting rod. Ref: NTSB file 3-3781.
N72	Bell UH-1H Iroquois (US Army)	30 Oct 75	3	D	Al. USA. Engine (turbine rotor). Ref: US Army.
N73	Hughes 500	12 Jan 76	0	S	Mildred Lake, Alta. Canada. Compressor. Ref: MoT Canada file W60002.
N74	Hughes 369HS	26 Jan 76	0	S	Yokohama, Japan. 3rd stage compressor blade. Origin: pitting corrosion. Ref: Japan MoT
N75	Fairchild FH-1100	2 Jul 76	3	D	Porter Lake, NWT, Canada. Transmission, main-rotor drive-shaft (Bendix coupling). Ref: MoT Canada file W60057
N76	Bell 206	21 Jul 76	0	S	Eastmain, Que. Canada. Engine air pressure line at flared end in pressure sleeve. Ref: MoT Canada file Q60086.
N77	Hughes 269C	2 Aug 76	0	D	Miyagi Pref., Japan. Stress concentration, exhaust valve of #2 cyl. Ref: Japan MoT.
N78	Hughes 369HS	5 Sep 76	0	S	Hornu, Belgium. 4th stage compressor blade. Ref: Belgium AA.
N79	Aerospatiale SA 316 Alouette III	5 Sep 76	0	S	Grassy Narrows, Ont. Canada. Fuel injection wheel of fuel system. Ref: MoT Canada file C60150
N80	Sikorsky Sea King 50 (RAN)	2 Dec 76	0	D	At sea off Nowra, Australia. Transmission oil filter retaining bolt. Ref: Royal Australian Navy.
N81	Bell 206L LongRanger	17 Dec 76	0	D	Anchorage, Alaska USA. Failure of turbine blade, turbine wheel. Ref: NTSB file 3-4160.
N82	Enstrom F-28A	13 Jan 77	0	S	Boynton Beach, Fla. USA. Transmission rotor drive system: clutch assembly, idler yoke. Ref: NTSB file 3-4269.
N83	Bell 214B-1	30 May 77	0	S	Clover Bar, Alta. Canada. Engine accessory drive inner bevel gear. Ref: MoT Canada file W70056.
N84	MBB BO 105	7 Jun 77	0	S	Intracoastal City, La. USA. Right engine fourth stage turbine wheel. Corroded & fatigue fracture. ICAO ADREP 222/77.
N85	Bell 47G-4A	8 Jun 77	0	D	Boitzenhagen, W. Germany. Connecting rod big-end bearing. Ref: W. German file 3X0199

N86 Hiller 12	15 Jun 77	0	S	Lemory, B.C. Canada. Crankshaft. MoT Canada file P70038.
N87 Aerospatiale SA 316B Alouette III	21 Jun 77	0	D	Tokushima Pref., Japan. Stress concentration at flange on coupling shaft of engine. Ref: Japan MoT.
N88 Westland Wessex 31B (RAN)	13 Jul 77	0	D	At sea, HMAS Melbourne. Engine compressor blades. Ref: Royal Australian Navy.
N89 Bell 214B1	30 Jul 77	0	S	Sawyers Bar, Cal. USA. Accessory inner bevel gear. NTSB file 3-3960.
N90 Hughes 269C	22 Aug 77	0	D	Yamagata Pref., Japan. Pitting corrosion at 3rd stage compressor blade Ref: Japan MoT
N91 Sikorsky S-58	30 Sep 77	1	S	Garmisch-Partenk, W. Germany. Carburetor: mixture-control pressure-diaphragm. Ref: W. German file 3X0515.
N92 Bell 47G-3B-1	2 Oct 77	0	S	Alsea, Ore. USA. Transmission rotor drive system: bogus part in clutch assembly. Central hub separated from centrifugal clutch drum. Web below thickness requirement. NTSB file 3-3593.
N93 Hughes 269B	1 Dec 77	0	S	Speedway, Ind. USA. Main rotor gear box ring gear drive coupling. Ref: NTSB file 3-4275.
N94 Hiller FH-1100	22 Dec 77	0	D	Walton, Oregon USA. Left transmission lift link strut. Role: aerial logging. Ref: NTSB file 3-4116.
N95 Bell 206B	1978	0	D	Queensland Australia. Drive shaft between engine & rotor gear box. Ref: Australia DoT.
N96 Westland Wessex 31B (RAN)	22 Jan 78	0	S	At sea, off Nowra, Australia. Drive shaft of engine-driven fuel pump. Ref: Royal Australian Navy.
N97 Bell 47G	6 Mar 78	0	S	New Bern, N.C. USA. Crankshaft (no. 1 conrod journal). Ref: NTSB file 3-1082.
N98 Bell 206B	9 Apr 78	0	S	East Meadow, N.Y. USA. Fuel pump drive splines. Ref: NTSB file 3-2171.
N99 Aerospatiale SA 330J Puma	7 May 78	2	S	Atlantic City, N.J. USA. Engine drive shaft failed, main rotor separated. Ref: NTSB file 3-2494

N100	Bell UH-1M Iroquois (US Army)	19 Oct 78	0	S	Pa. USA. Engine (gear assembly). Ref: US Army.
N101	Bell AH-1G HueyCobra (US Army)	31 Oct 78	0	D	Al. USA. Engine (pin). Ref: US Army.
N102	Bell 47G-4A	8 Nov 78	0	S	Hokkaido, Japan. # 2 connecting rod. Origin: pitting corrosion. Ref: Japan MoT.
N103	Hiller UH-12 Soloy	22 Dec 78	0	S	Lacomb, Ore. USA. Tachometer generator. NTSB file 3-4115.
N104	Bell 47	1979	0	D	Timber Creek, Australia. Turbo wastegate seal. Ref: Australia DoT
N105	Hiller UH-12	1979	2	D	Dorisvale, NT Australia. Studs connecting torsion coupling to upper coupling. Ref: Australia DoT.
N106	Boeing Vertol CH-47C Chinook (US Army)	14 Mar 79	0	D?	S. Korea. Bevel gear in combining transmission. Ref: US Army
N107	Aerospatiale SA 360C Dauphin	20 Mar 79	0	S	Fukushima Pref., Japan. Flared part of fuel tube. Ref: Japan MoT.
N108	Bell 206B	3 Jun 79	0	D	Morgan City, La. USA. Turbine blade. NTSB file 3-2100.
N109	Fairchild FH-1100	25 Jul 79	0	S	Riviere Eternite, Que. Canada. Abraidable plastic compressor case liner was severely eroded on one side. Disturbed airflow. Fourth stage compressor blade failed. Ref: MoT Canada file Q90080.
N110	Kaman HH-43F	24 Aug 79	0	D	Hamilton, Mt. USA. Fracture of engine drive shaft (powershaft) in area of heavy wear. Ref: NTSB file 3-4011.
N111	Bell 206B	11 Sep 79	0	S	Merrimack, N.H. USA. PC line at fuel control. NTSB file 3-3170.
N112	Hughes 269	1980	0	S	Grove Hill, Australia. Lower pulley coupling shaft in transmission rotor drive system. Ref: Australia DoT.
N113	Bell OH-58A Kiowa (US Army)	10 Jan 80	0	D?	Germany. Engine gear assembly. Ref: US Army.
N114	Aerospatiale AS 350 Astar	26 Jan 80	1	S	Heaven Lake, Ont. Canada Axial-stage blade of engine. Ref: MoT Canada file 80-C00006.

N115	Hughes 269C	4 Apr 80	0	D	Te Anga, Te Kuiti, New Zealand. Main rotor ring gear drive shaft. Fretting near lockpin holes. Ref: NZ brief 80-048.
N116	Bell 206L-1 LongRanger	6 May 80	2	D	Gibson, La. USA. #4 bearing failed in reduction gear assembly. Ref: NTSB file 3-2939.
N117	Boeing Vertol CH-47C Chinook (US Army)	4 Jun 80	0	S	S. Korea. #1 engine exploded (gear assembly failure). Ref: US Army.
N118	Bell 206A	13 Jun 80	0	D	McKinley Bay, NWT Canada. 1st stage gas producer turbine wheel. Thermal fatigue precrack in outer rim of wheel. Ref: MoT Canada file 80-W00052.
N119	Hiller 12	5 Jul 80	0	S	Lockwood Lake, Sask. Canada. No. 1 connecting rod. Origin: galled area on bore of rod at crankshaft end. Ref: MoT Canada file C00082.
N120	Hughes 269B	12 Jul 80	0	S	Washington, D.C. USA. Fatigue fracture of #5 hold down stud on #3 cylinder. Corrosion. Ref: NTSB file 3-2181.
N121	Hughes 500	25 Jul 80	0	S	Falcon Lake, Man. Canada. Tooth on output drive bevel gear in main rotor drive assembly. Coarse machining marks in root fillet of teeth. Ref: MoT Canada file C00091.
N122	Aerospatiale SA 360C Dauphin	21 Sep 80	0	S	Kagoshima Pref., Japan. Input flange of main gear box. Ref: Japan.
N123	Hughes 269C	31 Oct 80	0	D	170 nm north of Ostersund, Sweden. Transmission drive shaft broke 9 cm from end. Torsional fatigue. Subsurface initiation. Ref: Sweden Board of Civil Aviation
N124	Bell 206B	31 Dec 80	0	S	Patterson, La. USA. 2nd stage turbine wheel blade. NTSB file 3-3691
N125	Hughes 269C	10 Jan 81	0	D	Viper, Ky. USA. Lower coupling drive shaft. NTSB file 3-0313.
N126	Bell 206B	22 Feb 81	0	S	Niigata Pref., Japan. 3rd stage blade. Ref: Japan MoT.
N127	Bell 206L-1 LongRanger	25 Mar 81	0	S	Gulf of Mexico, USA. Compressor, spline adapter. NTSB file 3-1400.
N128	Aerospatial AS 350D Astar	11 Apr 81	0	S	Edmond, Ok. USA. Bendix fuel control speeder spring. Ref: NTSB file 3-0990.

N129	Sikorsky S-61L Mark I	15 Apr 81	0	D	Cape Town, South Africa. Spur gear in main rotor gearbox. Ref: South Africa DoT; ICAO ADREP 108/81.
N130	Bell 206L-1 LongRanger	25 Apr 81	0	S	Leeville, La. USA. Turbine nozzle. Ref: NTSB file 3-2527.
N131	Bell 47G-4A	28 Apr 81	0	S	Birds Hill, Man. Canada. Camshaft gear attachment bolts, improper assembly. Ref: MoT Canada file C10031.
N132	Bell 47A-J2	29 Apr 81	0	S	Whitehorse, Y.T. Canada. Engine cooling fan assembly mounting studs. Ref: MoT Canada file W10031.
N133	Hughes 269C	4 May 81	0	S	Washington, D.C. USA. Main rotor shaft ring gear carrier. Ref: NTSB file 3-1426.
N134	Bell 47J-2	26 May 81	0	S	Branson, Mo. USA. #6 con rod. Ref: NTSB file 3-1089.
N135	Sikorsky S-64 Skycrane	5 Jun 81	1	S	Kitsault River, B.C. Canada. No. 1 engine, 6th stage compressor disc. Ref: MoT Canada file P10902.
N136	Hughes 500	24 Aug 81	1	D	Philomena, Alta. Canada. Transmission input pinion (corrosion pit). Ref: MoT Canada file W10103.

Total Fatalities: 44

APPENDIX O

ROTARY-WING - LANDING GEAR

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
O1	Sikorsky S-61	15 Jul 63	0	S	Los Angeles, Ca. USA. Right main gear failed. Forged fittings. Origin: sharp corner on inside surface on closed end of tubular section. Ref: WHAS p. 3.
O2	Sikorsky S-61L (L.A. Airways)	15 Mar 66	0	S	Los Angeles, Cal. USA. Right landing gear brace fitting. Ref: NTSB file 1-0017.
O3	Bell 204B	4 Apr 68	0	S	Kenai, Alas. USA. Rear float cross tube. NTSB file 3-2083.
O4	Bell 47G-2	11 May 69	0	S	Lindenhurst, N.Y. USA. Skid assembly. Ref: NTSB file 3-1834.
O5	Hughes 269A	31 Jul 74	0	D	W. Memphis, Ark. USA. Landing gear strut assembly. Ref: NTSB file 3-2129.
O6	Bell TH-1G Iroquois (US Army)	16 May 75	0	S	Tx. USA. Left forward & aft cross tubes failed above the skid saddles. Ref: US Army.
O7	Bell 204B	6 Feb 77	0	S	Sonderstromfjord, Greenland. Landing gear floats, right hand side of rear cross tube. Ref: ICAO ADREP 43/77.
O8	Sikorsky S-61L (N.Y. Airways)	16 May 77	5	S	Pan Am building, New York, USA. Upper-right forward fitting of right main landing gear tube assembly. Matl: 7075-T73. Ref: NTSB file 1-0025
O9	Hughes 269C	1978	0	S	Surfers Paradise, Australia. Cracks in both skid gear & left forward shock strut. Ref: Australia DoT.
O10	Bell 205A-1 (on floats)	18 Jul 80	1	D	Arcola-Houston airport, Texas USA. Front cross tube of pontoon. Crack on right-forward cross tube where support saddle was riveted. Ref: NTSB file 3-3263.
O11	Bensen B-8M	28 Sep 80	0	S	St. Joseph, Il. USA. Support bar for main landing gear. Ref: NTSB file 3-2454.

Total Fatalities: 6

APPENDIX P

ROTARY-WING - MISCELLANEOUS

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
P1	Bell 47D-1	30 Oct 51	1	S	Burk's Falls, Ont. Canada. Tail-rotor gear-box pinion shaft. Ref: ICAO AAD No. 3, 1953, p. 77
P2	Hiller UH-12E	23 Apr 63	0	S	Shalalth, B.C. Canada. Tail rotor pinion gear. Ref: MOT Canada file 1951.
P3	Bell 47D-1	3 Jul 64	0	D	Harlingten, Texas USA. Fracture of tail rotor drive shaft assembly. Role: aerial application. NTSB file 2-0249.
P4	Bell 47G-2	6 Mar 65	0	S	Barney's River Station, N.S. Canada. Tail rotor drive shaft (existing crack - probably from overload). Ref: MOT Canada file 2486.
P5	Brantly 305	18 May 66	0	S	Annapolis, Md. USA. Right oil cooling fan shaft. NTSB file 2-0422.
P6	Bell 204B	28 May 66	1	D	Lincoln Sea, Canada. Radio antenna tube (attached to vertical stabilizer) failed from fatigue & struck tail rotor. Origin: rivet hole. Ref: MoT Canada Ser. No. 2940
P7	Brantly B-2B	3 Mar 67	0	S	Cedar Rapids, Iowa. USA. Tail rotor drive shaft assembly. NTSB file 2-0260
P8	Sikorsky S-51	29 Aug 67	0	S	Windsor Locks, Conn. USA. Tail rotor drive shaft assembly (drive shaft rivets sheared). Ref: NTSB file 2-0633
P9	Westland Whirlwind HC.12 (Queen's Flight, RAF)	7 Dec 67	4	D	England. Main rotor shaft. Crack at rotor-head end of drive shaft, inside the main-rotor gearbox. Ref: FI 1 Feb. 68 p. 143, & 21 Dec. 67 p 1018.
P10	Hiller 12B	27 May 68	0	S	Arroyo Grande, Cal. USA. Tail rotor drive shaft assembly (centering pin of cardan joint). NTSB file 3-2188.
P11	Bell 47G-3B-1	25 Jun 68	0	S	Boron, Cal. USA. Tail rotor drive shaft assembly (improperly installed roller bearing). NTSB file 3-2096.

P12	Bell 47G-3B-1	25 Jul 69	0	S	Fresno, Cal. USA. Tail rotor drive shaft assembly. NTSB file 3-3249
P13	Kawasaki/ Boeing KV-107 (Japanese Self-Defence Force)	1971	?	?	Japan. Failure of thrust deck, connecting the power-drive system to the fuselage, causing rear rotor to separate. Ref: FI 9 Mar. 72 p 368, & 13 Jan. 72 p. 74.
P14	Bell 47G-2A-1	10 Aug 71	2	D	Bellwood, Ill. USA. Tail rotor drive shaft yoke. Role: police patrol. Ref: NTSB file 3-4198
P15	Bell TH-13T (US Army)	6 Mar 72	0	D?	Al. USA. Tail rotor driveshaft assembly. Ref: US Army.
P16	S.N.I.A.S. SE 3160	21 May 72	0	S	Mayer, Ariz. USA. Clutch coupling bolts in universal joint. Ref: NTSB file 3-3954.
P17	Sikorsky S-55B	18 Jul 72	0	D	Benicia, Calif. USA. Front transmission support bracket failed. Over-sized engine installed. NTSB file 3-2519.
P18	Brantly B-2B	9 Nov 72	1	D	Oxford, England. Outboard pylon bearing shaft of main rotor blade. Ref: UK AIB CAAR 12/73.
P19	Bell 206B	19 Feb 73	5	D	Morgan City, La. USA. Pylon support link failed, causing complete failure of main rotor/transmission assembly. Ref: NTSB file 3-0135
P20	Bell 206B	22 Feb 73	1	D	Amelia, La. USA. Right pylon support link failed, causing in-flight failure of main rotor system. Ref: NTSB file 3-0425.
P21	Sud Aviation SA 318C Alouette II	2 Jun 73	0	D	Oberhoechstadt, W. Germany. Tail rotor separated, fracture of tail rotor shaft. Ref: W. German file 3X0149
P22	Brantly B-2	21 Nov 73	0	D	North Bergen, N.J. USA. Vertical drive of tail rotor drive shaft assembly at bolt holes 1 inch from upper end of shaft. Ref: NTSB file 3-3668.
P23	Bell UH-1H Iroquois (US Army)	19 Jun 74	0	S	S.C. USA. Connector failed, causing yaw. Ref: US Army.
P24	Sud Aviation SA 341G	15 Feb 75	0	S	San Jose, Cal. USA. Tail rotor failure. Transmission cowling rubbed against tail rotor incline shaft, eventually fatigue-failing shaft. Ref: NTSB file 3-0315.

P25	Agusta 47G-4	18 Feb 75	0	S	Seringhausen, W. Germany. Tail rotor driveshaft. Ref: W. German file 3X0022.
P26	Hughes 269C	26 Jul 75	0	S	Ensch, W. Germany. Bearing cage of main rotor clutch. Ref: W. German file 3X0319.
P27	Sikorsky S-62A	3 Oct 75	0	D	30 km from Reykjavik, Iceland. Driving gear of intermediate gear box failed (fatigue), causing tail rotor failure. A slipping bearing race contributed. Ref: Iceland
P28	Bell 47G-3B	12 May 76	0	S	Forks, Wash. USA. Tail rotor gear box, pinion shaft. Tail rotor separated. Ref: NTSB file 3-1227.
P29	Boeing-Vertol H-46 Sea Knight (US Navy or US Marines)	16 May 76	4	?	Mediterranean Sea off carrier USS Guadalcanal. Crack in main rotor shaft. Ref: FI 26 June 76 p. 1699.
P30	Brantly 305	1 Oct 76	0	D	Astey Village, England. Main rotor gearbox, forward attachment bolt (corrosion pit). Ref: UK Accident Report 5/78.
P31	Boeing Vertol CH-47C Chinook (US Army)	15 Jul 77	1	D	Germany. Main rotor shaft. Ref: US Army.
P32	Enstrom F-28C	7 Feb 78	0	S	Waverley, New Zealand. Tail rotor drive shaft. Fatigue strength reduced by softened condition & surface decarburisation. AISA 4130 steel. Ref: NZ brief 78-018.
P33	Enstrom F-28A	17 Feb 78	0	S	Centre Hill, New Zealand. Tail rotor drive shaft. Fatigue strength reduced by softened condition & surface decarburisation. Ref: NZ brief 78-026
P34	Bell OH-58A Kiowa (US Army)	1 May 78	0	S	Wa. USA. Power loss (tube assembly failure). Ref: US Army.
P35	Aerospatial AS 350C	14 Dec 78	0	S	Morgan City, La. USA. Tail rotor failure. Fatigue fracture of gear in accessory drive assembly. Ref: NTSB file 3-4335.
P36	Sikorsky Sea King 50 (RAN)	23 May 79	0	D	At sea off HMAS Melbourne. Tail rotor drive shaft. Ref: Royal Australian Navy.
P37	Hughes 500	8 Oct 79	0	S	Jenpeg, Man. Canada. Tail rotor drive flexible coupling. Ref: MoT Canada file C90124.

P-4
MISCELLANEOUS (ROTARY-WING)

P38 Hughes 369D	18 Oct 79	0	D	Trenton, N.J. USA. Tail rotor drive shaft coupling. Ref: NTSB file 3-3657.
P39 Sikorsky S-55	23 Oct 79	1	D	Davenport, Florida, USA. Main transmission support assembly separated. Ref: NTSB file 3-2438.
P40 Bell 47J-2A	8 Feb 80	0	S	N. Westerheim, W. Germany. Engine mount. Ref: W. German file 3X0003.
P41 Hughes 369HS	26 Jun 80	0	S	Herbert, New Zealand. Tail rotor transmission housing. Origin: microporosity. Ref NZ brief 80-076
P42 Bell 47G-2A Soloy	10 Jul 81	1	D	Vivian, La. USA. Tail rotor driveshaft (corrosion fatigue). Ref: NTSB file 3-1999.
P43 Robinson R22	6 Aug 81	0	S	Cincinnati, Oh. USA. Support bracket for tail rotor drive shaft damper. Ref: NTSB file 3-1715.
P44 Hiller UH-12E	8 Sep 81	0	S	Brentwood, Ca. USA. Bevel gear in tail rotor gear box. Ref: NTSB file 3-3016.
P45 Agusta AB 205A-1	14 Jan 82	0	D	Lyssjoen, Norway. Tail rotor drive shaft. REF: ICAO AAD 26/82.

Total Fatalities: 22

PART II
LISTING BY AIRCRAFT TYPE

APPPENDIX Q

LIST OF ROTARY-WING ACCIDENTS - ORDERED BY AIRCRAFT TYPE

ID No.	Aircraft Type	Accident Date	No. Dead	Dam	Remarks
					AEROSPATIALE SA 315 LAMA
	Airframe				
L33	Aerospatiale SA 315B Lama	5 Apr 81	0	S	Kawakawa Bay, New Zealand. Top right tailboom longeron at bushing attaching tailplane. Poor weld repairing previous damage.
					AEROSPATIALE AS 316/3160 ALOUETTE III
	Engine/Transmission				
N46	Aerospatiale Alouette III	8 Aug 72	0	S	Greybull, Wy. USA. Main drive shaft (faulty machining).
N79	Aerospatiale SA 316 Alouette III	5 Sep 76	0	S	Grassy Narrows, Ont. Canada. Fuel injection wheel of fuel system. Engine: Turbomeca Artouste.
N87	Aerospatiale SA 316B Alouette III	21 Jun 77	0	D	Tokushima Pref., Japan. Stress concentration at flange on coupling shaft of engine.
	Miscellaneous				
P16	S.N.I.A.S. SE 3160	21 May 72	0	S	Mayer, Ariz. USA. Clutch coupling bolts in universal joint. Tail rotor separated.
					AEROSPATIALE SA 318 ALOUETTE II
	Stabilizer Spar Tube				
L15	Sud Aviation SA 318C Alouette II	22 Jan 74	0	S	Schaphusen, W. Germany. Stabilizer spar tube (prohibited weld repair).
L20	Sud Aviation SA 318B Alouette II	27 Feb 75	0	S	Oberpleis, W. Germany. Tubular spar of stabilizer.

	Flight Controls				
M20	Aerospatiale SA 318 Alouette II	16 Jun 77	0	S	Hawkes Lake, Man. Canada. Tail rotor pitch change link. 3175 airframe hours.
	Tail Rotor Shaft				
P21	Sud Aviation SA 318C Alouette II	2 Jun 73	0	D	Oberhoechstadt, W. Germany. Tail rotor separated, fracture of tail rotor shaft.

AEROSPATIALE SA 330 PUMA

	Engine				
N99	Aerospatiale SA 330J Puma	7 May 78	2	S	Atlantic City, N.J. USA. Engine drive shaft failed, main rotor separated

AEROSPATIALE SA 341 GAZELLE

	Miscellaneous				
P24	Sud Aviation SA 341G	15 Feb 75	0	S	San Jose, Cal. USA. Tail rotor failure. Transmission cowling rubbed against tail rotor incline shaft, eventually fatigue-failing shaft.

AEROSPATIALE AS 350 ASTAR/ECUREUIL

	Tail Rotor				
K97	Aerospatiale AS 350 Astar	27 Feb 81	0	S	St. Faustin, Que. Canada. Tail rotor failure (tail rotor control fitting). Fitting not properly seated on tail rotor blade flange.
	Flight Controls				
M34	Aerospatial AS 350D Astar	4 May 81	0	S	Gulf of Mexico. Tail rotor pitch horn, PN 350A-12-1368.
	Engine				
N114	Aerospatiale AS 350 Astar	26 Jan 80	1	S	Heaven Lake, Ont. Canada Axial-stage blade, Avco Lycoming LTS-100 engine
N128	Aerospatial AS 350D Astar	11 Apr 81	0	S	Edmond, Ok. USA. Bendix fuel control speeder spring, P/N 2521724-2.
	Miscellaneous				
P35	Aerospatial AS 350C	14 Dec 78	0	S	Morgan City, La. USA. Tail rotor failure. Fatigue fracture of gear in accessory drive assembly.

AEROSPATIALE SA 360 DAUPHIN

	Engine				
N107	Aerospatiale SA 360C Dauphin	20 Mar 79	0	S	Fukushima Pref., Japan. Flared part of fuel tube.
N122	Aerospatiale SA 360C Dauphin	21 Sep 80	0	S	Kagoshima Pref., Japan. Input flange of main gear box.

AGUSTA-BELL (See Bell)

AIR & SPACE 18

Main Rotor

J35	Air & Space 18-A	16 Feb 76	0	S	Baton Rouge, La. USA. Main rotor blade drag strut link.

BELL 47/KAWASAKI KH-4

Main Rotor System

J8	Bell 47G-2	27 Aug 60	0	D	Tremble Lake, Ont. Canada. Main rotor blade grip, P/N 47-120-135-2M, at barrel of grip (thread). Damaged in previous accident.
J11	Bell 47J-2	29 Jun 64	0	S	Waltham, Mass. USA. Main rotor mast control stabilizer bar.
J20	Bell 47G-2	7 Apr 70	0	S	Timmins, Ont. Canada. Main rotor blade drag brace clevis. (Corrosion fatigue). Threads.
J21	Bell 47G-2	8 Jun 71	1	D	Branchville, N.J., USA. Main rotor blade & grip assembly separated in flight. Improper grip for Bell 47G-2. Role: aerial application.
J22	Bell 47G-3B	8 Sep 71	0	S	Brentwood, Cal. USA. Main rotor stabilizer bar.
J23	Bell 47G-2	20 Mar 72	0	S	Fremont, Iowa. USA. Main rotor blade grip.
J39	Bell 47G-4A	23 Mar 78	2	D	Morgan City, La. USA. Main rotor failure. Rotor blade counterweight-rod tie-bolt failed.
J46	Bell 47G-2	2 Aug 79	0	D	Neufchateau, Belgium. Clevis of one drag brace of main rotor blade.
J48	Bell 47G-2	24 Aug 79	0	S	Niagara Falls, Ont. Canada. Main rotor drag brace fitting.
J52	Bell 47G-2A	3 Sep 80	2	D	Cottonport, La. USA. Main rotor failure. Cyclic-pitch lateral torque tube pivot shaft failed.
J54	Bell 47G-5	12 Jun 81	0	S	Coloma, Wi. USA. Main rotor separated. Corrosion & fatigue fracture of stabilizer bar assembly, PN 140-248-3.

Tail Rotor System

K1	Bell 47B	2 Jun 55	2	D	Chapleau, Ont. Canada. Tail rotor hub. Origin: bottom of inboard undercut radius of spindle. Blade, blade grip and spindle separated. Cracks in copper plating

K2	Bell 47G-2	4 Sep 63	0	S	Stewart, B.C. Canada. Tail rotor blade at thrust side of bore of blade hub.
K4	Bell 47G	3 May 64	0	D	McFarlane Lake, Ont. Canada. Tail rotor blade grip.
K5	Bell 47G	27 Jul 64	0	S	Plymouth, Mass. USA. Tail rotor blade.
K6	Bell 47J-2	7 Dec 64	3	D	Venice, La. USA. Separation of tail rotor blade, blade grip.
K7	Bell 47J-2	28 Mar 65	1	D	Boston, Mass. USA. Failure of tail rotor blade at blade grip.
K8	Agusta-Bell 47J	6 Jun 65	3	?	Helsinki, Finland. Tail rotor separated. Fracture in groove on thrust bearing seat of tail-rotor blade grip.
K12	Bell 47G-2	23 Nov 65	0	S	Kelso, Wash. USA. Tail rotor blade PN 47-642-102-49 inside grip fitting in stress relief fillet.
K13	Bell 47J-2	9 Dec 65	0	S	Refugio, Tex. USA. Tail rotor pinion shaft (improper assembly). Herding cattle.
K14	Bell 47J-2	14 Jan 66	0	S	East Boston, Mass. USA. Tail rotor blade inside grip fitting in stress relief fillet.
K15	Bell 47G-4	31 Jan 66	0	S	Burbank, Cal. USA. Tail rotor blade PN 47-642-102-53.
K16	Bell 47G-2	10 Feb 66	3	?	Sydney, Australia. Tail rotor retention bolt failed, followed by separation of the tail rotor assembly.
K17	Bell 47G-2	19 Feb 66	0	S	Gold Hill, N.C. USA. Tail rotor blade in grip fitting stress relief fillet.
K18	Bell 47G-3B-1	20 Mar 66	0	S	Fredericksted, Vi. USA. Tail rotor blade inside grip fitting in stress relief fillet.
K19	Bell 47G-3B	20 Jul 66	0	S	Santa Ana, Cal. USA. Tail rotor blade.
K22	Bell 47D-1	11 Oct 66	0	S	Ellensburg, Wash. USA. Tail rotor hub retention bolt PN 47-641-052-3.
K23	Bell 47G	12 Oct 66	0	S	Tonasket, Wash. USA. Tail rotor hub assembly bolt PN 47-641-052-3.

K25	Bell 47J-2	7 Nov 66	4	D	Carpenter, Calif. USA. Tail rotor blade.
K27	Bell 47G-4	13 Sep 67	2	S	La Place, La. USA. Shell of tail rotor blade.
K28	Bell 47J-2A	13 Dec 67	2	D	Hanalei, Hawaii, USA. Tail rotor blade. Lack of bonding material between shell and grip.
K29	Bell 47G-4A	3 Jan 68	0	D	Los Angeles, Calif. USA. Tail rotor blade. Hours on blade: 567. Role: police patrol.
K32	Bell 47G-4A	26 Oct 68	0	S	Chicago, Ill. USA. Tail rotor blades.
K33	Bell 47J-2	10 Jan 70	2	D	Fairbanks, Alaska, USA. Tail rotor blades separated.
K34	Bell 47G-2	14 Aug 70	0	S	Panama City, Fla. USA. Tail rotor blade retaining bolt PN 47-461-052-3.
K37	Bell 47G-3B-1	30 Aug 72	1	D	Tuba City, Ariz. USA. Tail rotor blades. Origin: internal bearing shoulder.
K39	Bell 47D	7 Jul 73	0	S	Anacortes, Wash. USA. Tail rotor blade yoke P/N 47-641-057-9.
K40	Bell 47G-5	8 Jul 73	0	S	Albuquerque, N. Mex. USA. Fracture of tail rotor blade. Previous damage to tail rotor pitch control system (75% of wires, cable #1, damaged by wear).
K41	Kawasaki KH-4	14 Jul 73	0	D	Chiba Pref., Japan. Rear edge fitting on parts of tail rotor blade.
K42	Agusta 47G-2	8 Sep 73	2	D	Solingen, West Germany. Separation of tail rotor, failure of bolt. Allowable flight time on blade exceeded.
K43	Bell 47G-2	18 Sep 73	0	S	Viola, Ark. USA. Tail rotor blade P/N 47-642-102-43 (blade grip area).
K44	Bell 47G-5	4 Oct 73	0	S	Fresno, Cal. USA. Tail rotor blade P/N 47-642-102-51.
K47	Bell 47G-2	21 Oct 74	1	D	Hullern, West Germany. Separation of tail rotor due to fracture at blade root. Initiated by corrosion.
K51	Agusta 47G-2	20 May 75	0	D	Feldkirchen, W. Germany. Tail rotor blade yoke P/N 47-641-57-9, (883 hours on part).

K52	Bell 47H-1	20 May 75	0	S	Nashville, Tenn. USA. Tail rotor hub bolt P/N 47-641-052-3. 499.8 hours on bolt (retirement life: 600 hours).
K53	Bell 47G-2	26 May 75	0	S	Denmark, Ar. USA. Yoke tail rotor hub P/N 47-641-057-009.
K54	Bell 47G-2	2 Jul 75	1	D	Napa, Calif. USA. Improperly-machined tail rotor hub failed, blade separated from rotor yoke. P/N 47-641-052-3. Role: crop dusting.
K55	Bell 47G-2A	20 Jul 75	0	S	Freer, Tex. USA. Tail rotor blade.
K57	Bell 47G-5	10 Aug 75	0	S	Chandler, Ariz. USA. Tail rotor blade.
K59	Bell 47G-2	26 Aug 75	0	S	Elliott, S.C. USA. Tail rotor grip P/N 47-642-102-37.
K60	Bell 47G-2	21 Jan 76	0	D	Bad Friedrichsh. W. Germany. Tail rotor separated, fracture of tail rotor yoke P/N 47-641-4057-9. Hours on yoke: 1080. Scheduled replacement time: 2500 hours.
K62	Bell 47G-3B-1	17 Jul 76	2	D	Petersburg Arkansas, USA. Tail rotor separated. Rotor bades 22 hours past mandatory change time.
K64	Bell 47G-2	6 Nov 76	1	D	Pigeon Forge, Tenn. USA. Tail rotor blade P/N 47-642-102-49.
K65	Bell 47G-2	1977	0	S	Bullo River, NT, Australia. Blade thrust bearing & blade grip failure. Prior damage to bearing.
K67	Bell 47D	29 Apr 77	0	S	Pori, Finland. Tail rotor blade.
K69	Bell 47G-5A	6 May 77	0	D	Russiaville, In. USA. Tail rotor blade. Role: aerial application.
K70	Bell 47G-2	14 Jun 77	0	S	Santa Monica, Cal. USA. Tail rotor, yoke rotor hub P/N 47-641-057-9K in tail rotor gear box.
K75	Bell 47G-1	18 Feb 78	0	S	Buttonwillow, Cal. USA. Yoke tail rotor hub P/N 47-641-057-9.
K77	Bell 47G	15 Jul 78	1	D	Loughman, Florida USA. Tail rotor blade P/N 47-642-102-051. Blade time 77.5 hours. Role: crop dusting.

K78	Bell 47G-2	16 Jul 78	0	S	Pigeon Forge, Tenn. USA. Tail rotor blade grip P/N 47-642-102. In service 468 hours.
K79	Bell 47G-2	12 Aug 78	0	S	Soledad, Cal. USA. Tail rotor blade (PN 47-642-K02-55) at insert on shank.
K80	Bell 47G-2	12 Aug 78	1	D	Omega, Georgia USA. Tail rotor blades. Role: crop spraying.
K87	Bell 47D	8 Jun 79	0	S	Parchman, Miss. USA. Tail rotor blade.
K88	Bell 47G-2	17 Jun 79	2	D	Jundah, Qld. Australia. Tail rotor blade grip at relief radius of outer bearing.
K90	Bell 47G	30 Jul 79	0	S	St. Andrews, Man. Canada. Tail rotor at blade grip.
K91	Bell 47J-2	14 Sep 79	5	D	Long Beach, Calif. USA. Tail rotor at inside diameter of blade grip. Time on blade: 536.4 hours. P/N 47-642-102.
K92	Bell 47G-2	8 Mar 80	0	D	Brentwood, Calif. USA. Tail rotor blade yoke P/N 47-641-057-9. Role: spraying.
K94	Bell 47D-1	22 Jul 80	0	S	Milan, Mi. USA. Tail rotor blade, PN 47-642-102-49, at outboard bearing relief radius of grip.
K95	Bell 47	1981	0	S	Stanthorpe, Queensland Australia. Tail rotor at blade grip.
K96	Bell 47G-2	20 Feb 81	0	S	Abbotsford, B.C. Canada. Tail rotor blade grip. Service life 300 hours. Blade had been on 3 different helicopters for a total of 1308 hours.

Tail-Rotor Drive Shaft Assembly

P3	Bell 47D-1	3 Jul 64	0	D	Harlingten, Texas USA. Fracture of tail rotor drive shaft assembly, causing loss of tail rotor. Role: aerial appl.
P4	Bell 47G-2	6 Mar 65	0	S	Barney's River Station, N.S. Canada. Tail rotor drive shaft (existing crack - probably from overload).
P11	Bell 47G-3B-1	25 Jun 68	0	S	Boron, Cal. USA. Tail rotor drive shaft assembly (improperly installed roller bearing).
P12	Bell 47G-3B-1	25 Jul 69	0	S	Fresno, Cal. USA. Tail rotor drive shaft assembly.

P14	Bell 47G-2A-1	10 Aug 71	2	D	Bellwood, Ill. USA. Tail rotor drive shaft yoke. Role: police patrol.
P15	Bell TH-13T (US Army)	6 Mar 72	0	D?	Al. USA. Tail rotor driveshaft assembly.
P25	Agusta 47G-4	18 Feb 75	0	S	Seringhausen, W. Germany. Tail rotor driveshaft.
P42	Bell 47G-2A Soloy	10 Jul 81	1	D	Vivian, La. USA. Tail rotor driveshaft, P/N 47-644-234-3, corrosion fatigue from end of cadmium plated sleeve.

Tail Rotor Gear Box Pinion Shaft

P1	Bell 47D-1	30 Oct 51	1	S	Burk's Falls, Ont. Canada. Tail-rotor gear-box pinion shaft.
P28	Bell 47G-3B	12 May 76	0	S	Forks, Wash. USA. Tail rotor gear box, pinion shaft. Tail rotor separated.

Airframe

L4	Bell 47G	26 Jun 67	0	S	Lincoln, Kans. USA. Tail rotor assembly broke off tail boom due to failure of housing yoke.
L9	Bell 47J	1970	0	S	Cook SA, Australia. Stabilizer tube assembly at inboard end. Severe fretting at inner & outer tubes.
L14	Bell 47G-5	25 Oct 73	2	D	Waynesburg, Pa. USA. Tail boom separated at STA 70, poor weld repairing previous damage.
L26	Bell 47K	22 May 76	0	D	Greenwich, R.I. USA. Failure of right elevator tubular spar. Elevator struck tail rotor.

Flight Controls

M2	Bell 47G-2	11 Jul 64	0	S	Wall, S.D. USA. Tail rotor pitch control system.
M5	Bell 47G-2	2 Dec 67	0	S	Lahabra, Cal. USA. Tail rotor pitch change link (improper installation). Tensile strength below mfr requirements.
M7	Bell 47G-5	23 Nov 68	0	S	Rochester, Mass. USA. Failure of shaft to cylinder servo valve, cyclic pitch control system.
M12	Bell 47G	5 Mar 70	0	S	Fort Worth, Tex. USA. Sheared delta hinge bolt caused failure of pitch control bearing & tail rotor separation.
M13	Bell 47G-5	21 Jan 72	0	S	Koloa, Hawaii. USA. Cyclic-pitch control boost cylinder.

M16	Bell 47G-3B-1	5 Sep 74	1	D	Ogden, Utah USA. Lost lateral cyclic control. Separation of shaft P/N 47-725-853-5 due to off-centre drilled hole.
M17	Bell 47G-4A	10 Jan 76	0	S	Encinal, Tex. USA. Tail rotor pitch change link.
M22	Kawasaki KH-4	9 Aug 77	0	D	Ibaragi Pref., Japan. Origin: Pitting corrosion at support parts of torque tube assembly.
M24	Bell 47G-5	1978	0	S	Winton, Qld. Australia. Tail rotor pitch-change rod. Role: cattle mustering.
M26	Bell 47G-4	12 Jun 78	0	S	Bremm A.D. Mosel, W. Germany. Tail rotor pitch control system.
M27	Westland 47G-3	11 Jul 78	0	D	Wintringen, W. Germany. Tail rotor pitch control system, steering cable
M30	Agusta 47J-3	11 Jun 79	0	S	Iphofen, W. Germany. Tail rotor pitch control system.
M31	Bell 47G-3B KH-4	11 Jun 80	0	D	Ibaragi Pref., Japan. Fitting bolt of forward & aft cyclic control rod.
M32	Bell 47G-2A	3 Sep 80	2	D	Cottonport, La. USA. Lateral control torque tube pivot shaft of cyclic pitch control system.
M35	Westland 47G-3B-1	4 Jul 81	0	S	Koldingen, W. Germany. Main rotor cyclic pitch control. Damper shaft in region of clamp.

Engine/Transmission

N1	Bell 47D-1	15 Sep 50	0	S	Liege, Belgium. Blade of engine cooling fan.
N4	Bell 47G	14 Oct 63	0	S	Porcupine River, Que. Canada. Connecting rod bolts at thread.
N7	Bell 47G	27 Sep 64	0	S	Bakersfield, Cal. USA. Exhaust rocker arm bolt, no. 3 cylinder.
N8	Bell 47J-2	22 Dec 64	0	S	Philadelphia, Pa. USA. No. 1 cylinder connecting rod.
N13	Bell 47D-1	12 Mar 66	0	S	Shelby, Miss. USA. No. 2 connecting rod.
N15	Bell 47G-3B-1	16 Aug 66	0	S	Telegraph Creek, B.C. Canada. Fan blade (improper installation).

N18	Bell 47J-2	26 Oct 66	0	S	Brookline, Mass. USA. Teeth in fan drive gears, P/N 47-620-207 & -530.
N19	Bell 47G-3B	4 Jan 67	0	S	Glenwood Springs, Colo. USA. Piston pin, no. 6 cylinder.
N25	Bell 47G-3B-1	24 Jun 68	0	S	Fuller Lake, Y.T. Canada. Wrist pin of piston, no. 1 cylinder.
N30	Bell 47G-3B-1	23 Jul 69	0	S	Stirling City, Cal. USA. External supercharger (turbine wheel).
N33	Bell 47J-2	22 Apr 70	0	S	Piscataway, N.J. USA. Free wheeling gear in main rotor drive system. P/N 47-620-531-1.
N38	Bell 47G-4-A	10 Sep 71	0	S	Shelbyville, Ky. USA. Bolt to # 6 con rod.
N49	Bell 47G-3B-1	9 Nov 72	3	D	Piz Muttler, Switzerland. Cooling fan blade (fretting at bolt).
N54	Bell 47G-4A	5 Apr 73	0	S	Washington, D.C. USA. No. 6 cylinder conrod cap bolt.
N58	Bell 47G-3B-2	1974	0	S	Mt. Bundy Stn. Australia. Connecting rod bearing. Origin: galling on bearing borecon rod.
N71	Bell 47J-2	22 Oct 75	0	S	Conshocken, Pa. USA. No. 5 connecting rod P/N LW-13422.
N85	Bell 47G-4A	8 Jun 77	0	D	Boitzenhagen, W. Germany. Connecting rod big-end bearing.
N92	Bell 47G-3B-1	2 Oct 77	0	S	Alsea, Ore. USA. Transmission rotor drive system: bogus part in clutch assembly. Central hub separated from centrifugal clutch drum. P/N 47-620-691, web below thickness requirement.
N97	Bell 47G	6 Mar 78	0	S	New Bern, N.C. USA. Crankshaft (no. 1 conrod journal).
N102	Bell 47G-4A	8 Nov 78	0	S	Hokkaido, Japan. # 2 connecting rod. Origin: pitting corrosion.
N104	Bell 47	1979	0	D	Timber Creek, Australia. Turbo wastegate seal.
N131	Bell 47G-4A	28 Apr 81	0	S	Birds Hill, Man. Canada. Camshaft gear attachment bolts, improper assembly.
N132	Bell 47A-J2	29 Apr 81	0	S	Whitehorse, Y.T. Canada. Engine cooling fan assembly mounting studs.

N134	Bell 47J-2	26 May 81	0	S	Branson, Mo. USA. #6 con rod.
	Landing Gear				
O4	Bell 47G-2	11 May 69	0	S	Lindenhurst, N.Y. USA. Skid assembly.
	Miscellaneous				
P40	Bell 47J-2A	8 Feb 80	0	S	N. Westerheim, W. Germany. Engine mount.

BELL 204 (UH-1/B/M IROQUOIS)

	Tail Rotor				
K21	Bell 204B	8 Oct 66	11	D	Morgan City, La. USA. Tail rotor.
	Airframe				
L6	Bell 204B	22 Mar 68	3	?	Bass Strait, Australia. Tail fin structure (tail rotor imbalance). Trunnion thrust washer not installed during maintenance.
L27	Bell 204B	11 Feb 77	0	D	Shizuoka Pref., Japan. Fitting flange of vertical fin.
	Landing Gear				
O3	Bell 204B	4 Apr 68	0	S	Kenai, Alas. USA. Rear float cross tube.
O6	Bell TH-1G Iroquois (US Army)	16 May 75	0	S	Tx. USA. Left forward & aft cross tubes failed above the skid saddles.
O7	Bell 204B	6 Feb 77	0	S	Sonderstromfjord, Greenland. Landing gear floats, right hand side of rear cross tube.
	Engine				
N50	Bell UH-1B	18 Jan 73	0	S	Al. USA. Engine power shaft.
N100	Bell UH-1M Iroquois (US Army)	19 Oct 78	0	S	Pa. USA. Engine (gear assembly).
	Antenna				
P6	Bell 204B	28 May 66	1	D	Lincoln Sea, Canada. Radio antenna tube (attached to vertical stabilizer) failed from fatigue & struck tail rotor, causing failure. Origin: rivet hole.

BELL MODEL 205 (UH-1D/H IROQUOIS)

	Tail Rotor				
K45	Bell UH-1H Iroquois (US Army)	23 Jul 74	0	S	Mo. USA. Tail rotor grip.
K46	Bell UH-1H Iroquois (US Army)	19 Aug 74	0	S	Fl. USA. Tail rotor at blade grip.

K50	Bell UH-1H Iroquois (US Army)	13 May 75	0	S	In. USA. Tail rotor (stiffener spar).
K58	Bell UH-1H Iroquois (US Army)	22 Aug 75	0	D	Ky. USA. Tail rotor grip assembly.
	Engine				
N64	Bell UH-1H Iroquois (US Army)	23 Oct 74	0	S	Tn. USA. Engine (blade).
N72	Bell UH-1H Iroquois (US Army)	30 Oct 75	3	D	Al. USA. Engine (turbine rotor).
	Miscellaneous				
P23	Bell UH-1H Iroquois (US Army)	19 Jun 74	0	S	S.C. USA. Connector failed, causing yaw.

BELL 205A-1

	Tail Rotor				
K36	Bell 205A-1	29 May 72	11	D	Dulac, La. USA. Tail rotor blades separated (grips failed).
	Airframe				
L25	Bell 205A-1	23 Apr 76	12	D	Gulf of Mexico near Louisiana USA. Tail boom/fuselage attach fittings.
	Flight Controls				
M15	Bell 205A-1	21 Jul 74	0	D	Umiat, Alaska USA. Tail rotor pitch-change chain failed, causing failure of tail rotor.
M28	Bell 205A-1	18 Aug 78	1	D	Dennison Mines, BC, Canada. Tail-rotor pitch-change chain. P/N 204-001-739-3. 35 hours on chain.
	Pontoon Cross-Tube				
O10	Bell 205A-1 (on floats)	18 Jul 80	1	D	Arcola-Houston airport, Texas USA. Front cross tube of pontoon. Crack on right-forward cross tube where the support saddle fitting was riveted.
	Tail Rotor Drive Shaft				
P45	Agusta AB 205A-1	14 Jan 82	0	D	Lyssjoen, Norway. Tail rotor drive shaft.

BELL 206 JETRANGER/LONGRANGER

	Main Rotor System				
J25	Bell 206B	10 Aug 72	4	S	Embar, Labrador, Canada. Main rotor-blade retention strap fitting.
J31	Bell 206A	1 Feb 75	1	D	Milford, Connecticut, USA. Main rotor separated in flight. Lower main rotor pitch-change mechanism clevis.
J32	Bell 206A	23 Oct 75	4	D	Hiddensen, West Germany. Main rotor blade.

J34	Bell 206B	17 Apr 76	1	D	Leeville, La. USA. Main rotor tension-torsion strap failed, causing rotor failure.
J36	Bell 206B	11 Dec 76	0	S	Morgan City, La. USA. Main rotor tension torsion strap separated.
J37	Bell 206B	18 Feb 77	0	S	Atlanta, Ga. USA. Main rotor trunnion separated.
J38	Bell 206B	17 Mar 77	1	D	Intracoastal City, La. USA. Main rotor tension-torsion strap.
J50	Bell 206L	9 Jan 80	0	S	Opinaca, Que. Canada. Main rotor trunnion (lack of tempering). Origin: spindle fillet. Airframe 3226 hours.
	Tail Rotor				
K89	Bell 206B	21 Jul 79	0	S	Alpine, N.J. USA. Fatigue fracture of tail rotor blade. ELT antenna separated due to fatigue. Tail rotor grooves match ELT antenna.
	Flight Controls				
M8	Bell 206A	15 Mar 69	0	D	Springfield, Ohio. USA. Right-hand cyclic bell-crank support.
M9	Bell 206A	20 Jul 69	1	S	Mile 142 Alaska Highway, BC, Canada. Bearing connecting pitch link to swash-plate outer ring went out of position. Pitch link lower clevis contacted the swash-plate horn, causing abnormal bending loads, & fatigue failure of clevis.
	Engine/Transmission				
N26	Bell 206A	31 Aug 68	0	S	Medfra, Alas. USA. First stage compressor vanes.
N34	Bell 206A	25 Apr 70	0	S	Morgan City, La. USA. Blade of 2nd stage gas producer turbine wheel. P/N 6857912.
N35	Bell 206A	21 May 70	0	S	Pennsauken, N.J. USA. Two 5th stage compressor blades.
N36	Bell 206A	19 Jan 71	0	S	Lac Duprat, Que. Canada. Compressor rotor assembly's 3rd stage compressor blades (abnormal vibrations).
N37	Bell 206A	9 Jun 71	0	D	Gulf of Mexico off Louisianna, USA. 2nd phase turbine wheel.
N45	Bell 206A	2 Aug 72	0	S	Rocky Hill, Conn. USA. Compressor blade (overhaul overdue).
N68	Bell 206A	30 Jul 75	0	S	Barter Island, Ak. USA. 5th stage compressor wheel blades.

N76	Bell 206	21 Jul 76	0	S	Eastmain, Que. Canada. Engine air pressure line at flared end in pressure sleeve. Allison 250 engine.
N81	Bell 206L LongRanger	17 Dec 76	0	D	Anchorage, Alaska USA. Failure of turbine blade, turbine wheel.
N95	Bell 206B	1978	0	D	Queensland Australia. Drive shaft between engine & rotor gear box.
N98	Bell 206B	9 Apr 78	0	S	East Meadow, N.Y. USA. Fuel pump drive splines.
N108	Bell 206B	3 Jun 79	0	D	Morgan City, La. USA. Turbine blade.
N111	Bell 206B	11 Sep 79	0	S	Merrimack, N.H. USA. PC line at fuel control.
N116	Bell 206L-1 LongRanger	6 May 80	2	D	Gibson, La. USA. #4 bearing failed in reduction gear assembly.
N118	Bell 206A	13 Jun 80	0	D	McKinley Bay, NWT Canada. 1st stage gas producer turbine wheel. Thermal fatigue precrack in outer rim of wheel. Wheel hours: 742 (approved life: 750).
N124	Bell 206B	31 Dec 80	0	S	Patterson, La. USA. 2nd stage turbine wheel blade.
N126	Bell 206B	22 Feb 81	0	S	Niigata Pref., Japan. 3rd stage blade.
N127	Bell 206L-1 LongRanger	25 Mar 81	0	S	Gulf of Mexico, USA. Compressor, spline adapter, PN 6899243.
N130	Bell 206L-1 LongRanger	25 Apr 81	0	S	Leeville, La. USA. Turbine nozzle.

Pylon Support Link

P19	Bell 206B	19 Feb 73	5	D	Morgan City, La. USA. Pylon support link failed, causing complete failure of main rotor/transmission assembly
P20	Bell 206B	22 Feb 73	1	D	Amelia, La. USA. Right pylon support link failed, causing in-flight failure of main rotor system.

BELL OH-58 KIOWA

Main Rotor

J43	Bell OH-58A Kiowa (US Army)	25 Aug 78	3	D	Germany. Main rotor blade assembly.

Engine

N53	Bell OH-58A Kiowa (US Army)	29 Mar 73	0	S	N.C. USA. Engine compressor rotor.

N61	Bell OH-58A Kiowa (US Army)	9 Apr 74	0	S	Germany. Engine compressor rotor.
N62	Bell OH-58A Kiowa (US Army)	10 Sep 74	0	S	Ky. USA. Compressor rotor.
N113	Bell OH-58A Kiowa (US Army)	10 Jan 80	0	D?	Germany. Engine gear assembly.
	Miscellaneous				
P34	Bell OH-58A Kiowa (US Army)	1 May 78	0	S	Wa. USA. Power loss (tube assembly failure)

BELL MODEL 209 (AH-1 HUEYCOBRA)

	Main Rotor				
J27	Bell AH-1G HueyCobra (US Army)	26 Nov 73	2	D	Ok. USA. Main rotor blade assembly.
	Flight Controls				
M33	Bell AH-1S HueyCobra (US Army)	23 Mar 81	0	D	Germany. Failure of tube assembly.
	Engine				
N41	Bell AH-1G HueyCobra (US Army)	1 Mar 72	0	S	Vn. USA. Engine (compressor blade).
N101	Bell AH-1G HueyCobra (US Army)	31 Oct 78	0	D	Al. USA. Engine (pin).

BELL 212 TWIN TWO-TWELVE

	Main Rotor				
J33	Bell 212	3 Nov 75	9	D	Gulf of Mexico, near Louisiana USA. Main rotor blades separated. 866 hours on blade
	Flight Controls				
M36	Bell 212	11 Sep 81	0	S	Wadlin Lake, Alta. Canada. "White" tail rotor pitch link. Premature wear of rod end bearing produced abnormal loading & fatigue initiation.

BELL 214

	Tail Rotor				
K82	Bell 214	11 Nov 78	1	D	Col de Marie Blan, France. Tail rotor and rear transmission box separated. Vibration caused by flapping of tail rotor as a result of abnormal wear of universal joint. 3 fastening bolts on tail rotor broke in fatigue.
	Airframe				
L29	Bell 214B-1	31 May 77	2	D	Liberty, Wash. USA. Separation of vertical fin.

Engine/Transmission

N83	Bell 214B-1	30 May 77	0	S	Clover Bar, Alta. Canada. Engine accessory drive inner bevel gear. Avco Lycoming T-5508D engine. 43 airframe hours.
N89	Bell 214B-1	30 Jul 77	0	S	Sawyers Bar, Cal. USA. Accessory inner bevel gear P/N 2-070-005-02.

BELL 222

Flight Controls

L35	Bell 222	16 Apr 82	3	D	Hinton, Ok. USA. Main rotor blade control link.

BENSEN B-8M GYRO-COPTER

Main Rotor

J10	Bensen B-8M Gyro-Copter	19 Jun 64	1	D	Nacogdoches, Tex. USA. Spindle holding main rotor to mast failed, allowing rotor to separate.
J13	Bensen B-8M Gyro-Copter	28 Jan 67	1	D	Chino, Calif. USA. Main rotor separated in flight. Rotor spindle not made to specifications.

Flight Controls

M4	Bensen B-8M Gyro-Copter	25 Sep 66	1	D	Benton, Pa. USA. Head fork assembly strap.

Landing Gear

O11	Bensen B-8M	28 Sep 80	0	S	St. Joseph, Il. USA. Support bar for main landing gear.

BOEING VERTOL MODEL 42 (See Vertol Model 42)

BOEING VERTOL MODEL 44 (See Vertol Model 44)

BOEING VERTOL MODEL 107/CH-46

Main Rotor

J28	Boeing Vertol CH 113A Voyageur (Canadian Forces)	20 Mar 74	3	D	Edmonton, Alta. Canada. Forward red rotor blade failed. Origin: corrosion pit on main D spar at mid-chord.

Main Rotor Shaft

P29	Boeing-Vertol H-46 Sea Knight (US Navy or US Marines)	16 May 76	4	?	Mediterranean Sea off carrier USS Guadalcanal. Crack in main rotor shaft.

Engine/Transmission

N5	Boeing Vertol 107-II (Japanese Self-Defence Force)	14 Oct 63	6	D	Jamaica, N.Y USA. Fatigue failure of quill drive shaft due to contamination of the lubrication system in aft transmission assembly.

	Thrust Deck				
P13	Kawasaki/ Boeing KV-107	1971	?	?	Japan. Failure of thrust deck, connecting the power-drive system to the fuselage, causing rear rotor to separate.

BOEING VERTOL CH-47 CHINOOK

	Main Rotor Blade				
J24	Boeing Vertol CH-47A Chinook (US Army)	10 May 72	34	D	Vn. USA. Aft green main rotor blade (spar).
	Main Rotor Shaft				
P31	Boeing Vertol CH-47C Chinook (US Army)	15 Jul 77	1	D	Germany. Main rotor shaft.
	Engine or Transmission				
N63	Boeing Vertol CH 147 Chinook (Canadian Forces)	18 Oct 74	5	D	Middletown, Pa. USA. Combining transmission spiral bevel gear. Origin: non-metallic inclusion on gear flange.
N67	Boeing Vertol CH-47C Chinook (US Army)	13 Jun 75	0	D	Germany. Blade in engine.
N106	Boeing Vertol CH-47C Chinook (US Army)	14 Mar 79	0	D?	S. Korea. Bevel gear in combining transmission.
N117	Boeing Vertol CH-47C Chinook (US Army)	4 Jun 80	0	S	S. Korea. #1 engine exploded (gear assembly failure).

BRANTLY B-2

	Main Rotor				
J26	Brantly B-2B	15 Aug 72	2	D	Duxbury, Mass. USA. Red main rotor blade separated in flight.
	Tail Rotor				
K9	Brantly B-2	28 Jun 65	0	S	Prophetstown, Ill. USA. Tail rotor blades (unapproved mod).
K30	Brantly B-2B	6 Feb 68	2	D	Lakeside Nebr. USA. Tail-rotor blade spar, inside bearing boss radius.
K35	Brantly B-2	12 Jun 71	0	S	Middleton, N.S. Canada. Tail rotor blade. Origin: inner wall surface of grip at thrust bearing shoulder relief radius (tool mark).
K76	Brantly B-2B	14 Jul 78	1	S	Nome, Alaska USA. Tail rotor blade at radius inboard of thrust bearing shoulder at leading edge. Role: herding animals. Matl: 2014-T6. Hours on blades: 2200 (service life: 2500).

K83	Brantly B-2B	15 Dec 78	2	D	Sloan, Iowa USA. Tail rotor blade.
K100	Brantly B-2B	10 Jun 81	2	D	Chesterton, In. USA. Tail rotor blade (blade shank outboard of double bearing location).
	Airframe				
L7	Brantly B-2B	6 Jul 68	0	S	Monroeville, Pa. USA. Right stabilizer spar tube.
	Engine				
N11	Brantly B-2B	25 Sep 65	0	S	Denver, Colo. USA. Connecting rod cap bolt.
N27	Brantly B-2	30 Mar 69	0	D	Aberdeen, Md. USA. No. 4 piston connecting-rod attach bolt.
	Tail-Rotor Drive-Shaft Assembly				
P7	Brantly B-2B	3 Mar 67	0	S	Cedar Rapids, Iowa. USA. Tail rotor drive shaft assembly.
P22	Brantly B-2	21 Nov 73	0	D	North Bergen, N.J. USA. Vertical drive of tail rotor drive shaft assembly at bolt holes 1" from upper end of shaft.
	Pylon Bearing Shaft				
P18	Brantly B-2B	9 Nov 72	1	D	Oxford, England. Failure of the outboard pylon bearing shaft of the main rotor blade. Blade separated.

BRANTLY 305

	Main Rotor				
J14	Brantly 305	29 May 67	2	D	Chamblee, Ga. USA. Brinelled main-rotor hub clevis bearings caused torsion strap assembly to fail in fatigue, & main rotor separated.
J15	Brantly 305	3 Nov 67	3	D	Taswell, Ind. USA. Main rotor clevis bearings seized, main rotor torsion straps failed & main rotor separated.
	Tail Rotor System				
K11	Brantly 305	23 Aug 65	0	S	Millheim, Pa. USA. Tail rotor blades.
K38	Brantly 305	23 May 73	0	S	Denver, Colo. USA. Tail rotor hub.
K56	Brantly B-305	31 Jul 75	0	D	100 km from Reykjavik, Iceland. Tail rotor (blade hub). Possibly improper installation.
	Engine				
N69	Brantly B-305	29 Sep 75	0	D	Budir, Faskrudsfjordur, Iceland. Piston rod. Engine time far above authorized lifetime.
	Miscellaneous				
P5	Brantly 305	18 May 66	0	S	Annapolis, Md. USA. Right oil cooling fan shaft. P/N 1385055.

P30	Brantly 305	1 Oct 76	0	D	Astey Village, England. Main rotor gearbox, forward attachment bolt. Origin: corrosion pit in shank of bolt. Airframe hours: 358.

CIERVA AIR HORSE

	Flight Controls				
M1	Cierva Air Horse	13 Jun 50	3	?	England. Carrier driving link of front rotor.

ENSTROM F-28A

	Tail Rotor System				
K10	Enstrom F-28	11 Jul 65	0	S	Marquette, Mich. USA. Tail rotor blades.
K31	Enstrom F-28	10 May 68	0	S	Milwaukee, Wis. USA. Rotor spindle of tail rotor.
K61	Enstrom F-28A	4 Apr 76	0	S	Blythe, Cal. USA. Tail rotor blades.
K63	Enstrom F-28A	9 Aug 76	2	D	Enon, Ohio USA. Tail rotor blades separated. Spindle machined below specifications, & tool marks in machined area.
K66	Enstrom F-28C	8 Jan 77	0	S	Fallentimber, Pa. USA. Tail rotor spindle P/N 28-15202.
K72	Enstrom F-28	31 Jul 77	0	S	Montgomery, Ala. USA. Reversed installation of bearing P/N Q30203 DT in tail rotor pitch control system caused tail rotor failure.
	Airframe				
L21	Enstrom F-28A	5 Jul 75	0	S	San Francisco, Cal. USA. Tail boom attach bolt.
	Engine/Transmission				
N65	Enstrom F-28A	1975	0	S	Curlew Waterhole, Australia. RH front transmission bolt failed, resulting in failure of collective pitch control bellcrank.
N82	Enstrom F-28A	13 Jan 77	0	S	Boynton Beach, Fla. USA. Transmission rotor drive system: clutch assembly, idler yoke P/N 28-13223.
	Tail Rotor Drive Shaft				
P32	Enstrom F-28C	7 Feb 78	0	S	Waverley, New Zealand. Tail rotor drive shaft. Fatigue strength reduced by softened condition & surface decarburisation. AISA 4130 steel.
P33	Enstrom F-28A	17 Feb 78	0	S	Centre Hill, New Zealand. Tail rotor drive shaft. Fatigue strength reduced by softened condition & surface decarburisation.

FAIRCHILD HILLER FH-1100

Main Rotor

J17	Hiller FH-1100	15 Nov 69	0	S	Nordegg, Alta. Canada. Lower tine of main rotor blade cuff, at blade retention bolt hole (fretting). Undertorquing of main rotor retention bolt.

Airframe

L18	Hiller FH-1100	24 Nov 74	1	D	Freeport, NY USA. Aft tail boom separated, cracks in tail fin spar channel. Role: police patrol.

Flight Controls

M10	Fairchild Hiller FH-1100	21 Jul 69	1	?	Opapimiskan Lake, Ont. Canada. Swash-plate input push-rod assembly at rod-end retainer.
M14	Hiller FH-1100	30 Jun 74	5	D	Umiat, Alaska USA. Swashplate assembly, cracks at two bolt holes.

Engine/Transmission

N24	Fairchild Hiller FH-1100	8 Jun 68	0	S	Fort Nelson, B.C. Canada. Forward diaphragm of centre disc on front end diaphragm pack of power transmission shaft.
N28	Hiller FH-1100	11 Jun 69	3	D	Niwelin Lake, NWT, Canada. Bendix engine-to-transmission driveshaft.
N44	Hiller FH-1100	19 Jul 72	0	S	North Bend, Wash. USA. 1 blade from each stage of 5th & 6th compressor wheel.
N75	Fairchild FH-1100	2 Jul 76	3	D	Porter Lake, NWT, Canada. Transmission, main-rotor drive-shaft. Bendix coupling failed in flight. 6775 airframe hours.
N94	Hiller FH-1100	22 Dec 77	0	D	Walton, Oregon USA. Left transmission lift link strut failed. Role: aerial logging.
N109	Fairchild FH-1100	25 Jul 79	0	S	Riviere Eternite, Que. Canada. Abraidable plastic compressor case liner was severely eroded on one side. Disturbed airflow. Fourth stage compressor blade failed.

FAIREY AVIATION FB-1 GYRODYNE

Main Rotor System

J4	Fairey Aviation FB-1 Gyrodyne	17 Apr 49	2	D	Great Britain. Rotor hub. UK's 1st fatal helicopter crash.

HILLER MODEL 360/UH-12

Main Rotor

J45	Hiller UH-12E	11 May 79	0	S	Independence, Ore. USA. Main rotor failed. Incidence push rod end bearing failed at outer shell.

J47	Hiller UH-12E	10 Aug 79	0	S	Tuscaloosa, Al. USA. Pin, main rotor, outboard, tension torsion bar P/N 51452.
	Tail Rotor				
K20	Hiller UH-12E	22 Jul 66	2	D	Cochrane, Ontario, Canada Tail-rotor spar at lower outboard trunnion attachment bolt hole.
K24	Hiller UH-12C	2 Nov 66	0	S	Mineral Wells, Tex. USA. Tail rotor hub.
K26	Hiller UH-12E	2 Sep 67	2	D	Near Ft. Nelson, B.C. Canada. Tail-rotor spar tube. Origin: fretting corrosion on outer surface of tube at bottom outboard attachment hole. Third rotor spar fatigue failure from this cause.
K68	Hiller UH-12E	6 May 77	0	S	Camerons Creek, New Zealand. Cuff (cuff & trunnion assembly of tail rotor) at bolt hole.
K73	Hiller UH-12E	1978	0	D	Wyndham, Australia. Tail rotor blade separated.
K98	Hiller UH-12E	3 Apr 81	0	D	Miami, Fl. USA. Tail rotor blade failure. Bogus part. Blade composed of impure skin material, rivets installed incorrectly, & bal screw not lock wired
	Flight Controls				
M3	Hiller UH-12E	7 Jul 65	0	D	Meeteetse, Wyo. USA. (Cyclic pitch control system). Bolt holding wobble plate pylon not properly secured, allowing plate to fail in fatigue. Role: aerial application.
M18	Hiller UH-12E	14 Mar 76	0	D	Bluff, Ut. USA. (Cyclic pitch control system). Wobble plate pylon failed.
M21	Hiller 12EJ3	28 Jul 77	1	D	Ketchikan, Alaska USA Cyclic pitch control system failed. Cyclic isolation-link hollow-shank rod-end bearing had same ID no. as correct solid rod end. Role: aerial survey.
M25	Hiller UH-12E	19 May 78	0	S	Karamea, New Zealand. Left tail rotor control cable, near pulley.
M29	Hiller UH-12J	20 Nov 78	0	S	Between Arawhata & Waitoto Rivers, New Zealand. Main rotor control "paddles" separated. Origin: fretting at inboard bolt holes by trunnion bearing cuffs.
	Engine/Transmission				
N2	Hiller 360	7 Feb 52	1	D	Toussus-le-Noble, France. Connecting rod, no. 2 cylinder.

N9	Hiller 360	6 Apr 65	0	S	Ludham, UK. No. 4 piston.
N16	Hiller UH-12E	24 Aug 66	0	S	Rainbow Lake, Alta. Canada. No. 1 connecting rod (inadequate torquing).
N17	Hiller UH-12E	11 Sep 66	0	S	Happy Camp, Cal. USA. No. 4 cylinder connecting rod bolt.
N29	Hiller UH-12E	9 Jul 69	0	S	Bettles, Alas. USA. No. 5 cylinder con rod cap and bolts.
N40	Hiller 360-UH	28 Feb 72	2	D	England. Failure of a planet gear in first-stage reduction housing, causing main rotor to detach
N43	Hiller UH-12E	7 Jul 72	0	S	Umiat, Alas. USA. # 3 conrod and cap (fretting).
N59	Hiller UH-12E	2 Feb 74	0	S	National Park, New Zealand. No. 6 cylinder con-rod bolt.
N86	Hiller 12	15 Jun 77	0	S	Lemory, B.C. Canada. Crankshaft. Engine: Avco Lycoming VO-540.
N103	Hiller UH-12 Soloy	22 Dec 78	0	S	Lacomb, Ore. USA. Tachometer generator.
N105	Hiller UH-12	1979	2	D	Dorisvale, NT Australia. Studs connecting torsion coupling to upper coupling.
N119	Hiller 12	5 Jul 80	0	S	Lockwood Lake, Sask. Canada. No. 1 connecting rod. Origin: galled area on bore of rod at crankshaft end.

Miscellaneous

P2	Hiller UH-12E	23 Apr 63	0	S	Shalalth, B.C. Canada. Tail rotor pinion gear.
P10	Hiller 12B	27 May 68	0	S	Arroyo Grande, Cal. USA. Tail rotor drive shaft assembly (centering pin of cardan joint).
P44	Hiller UH-12E	8 Sep 81	0	S	Brentwood, Ca. USA. Bevel gear P/N 25211-5 in tail rotor gear box.

HILLER FH-1100 (See Fairchild Hiller FH-1100)

HUGHES 269

Main Rotor

J12	Hughes 269A	14 Oct 64	2	D	Houston, Texas USA. Main rotor. Lack of lubrication in bearings.

Tail Rotor

K3	Hughes 269A	9 Feb 64	0	S	Opa Locka, Fla. USA Tail rotor blades.

K48	Hughes 269C	15 Jan 75	2	D	Barnby Moor, Notts., England. Tail rotor spar (corrosion pit).
K74	Hughes 269B	10 Feb 78	0	D	Tahola, Wa. USA. Tail rotor swashplate assembly at threads.
	Airframe				
L1	Hughes 269A	19 Aug 65	0	S	Miami, Fla. USA. Looseness of stabilizer lower attach bolt caused upper attach bolt to fatigue fail, stabilizer came off.
L3	Hughes 269B	1 Mar 66	0	S	Memphis, Tenn. USA. Loose tail rotor abrasive strip caused vibration, failing improper rivets in stabilizer mount bracket.
L10	Hughes 269B	27 Sep 70	1	D	Ste. Pie de Bagot, Que. Canada. Tailboom left support strut lower fitting (fretting). Misalignment during rebuild after previous accident.
L12	Hughes 269B	11 May 72	0	S	Saratoga, N.Y. USA. Tail boom attach strut.
L16	Hughes 269B	21 Feb 74	0	S	Saitama Pref., Japan. Cluster fitting of centre frame. Crack origin: pitting corrosion.
L17	Hughes 269B	27 May 74	0	S	Las Vegas, Nev. USA. Horizontal stabilizer attachment PN 2516.
L19	Hughes 269B	27 Nov 74	0	D	Omahaki Station, New Zealand. Attachment lug of port tailboom support strut.
L22	Hughes 269B	15 Jul 75	0	D	Niigata Pref., Japan. Stress concentration at fitting metal and rivet of horizontal stabilizer.
L23	Hughes 269C	17 Sep 75	0	D	Rovaniemi Airport, Finland. Gear box to fuselage fastening strut broke, allowing rotor steering system to move freely.
L24	Hughes 269A	14 Oct 75	0	S	Wichita, Kans. USA. Tail boom end fitting (surface scratch).
L28	Hughes 269B	30 May 77	0	S	Evart, Mich. USA. Tail boom center attach fitting P/N 269A-2324-7
L32	Hughes 269C	15 Dec 79	1	D	West Milton, Ohio, USA. Separation of tail boom, tailboom centre attach fitting.
L34	Hughes 269A	29 Aug 81	0	S	Campbell River, B.C. Canada. Tailboom separated at tailboom centre support fitting (rivet head fretting).

Flight Controls

M19	Hughes 269B	5 Feb 77	2	D	Cascade Creek, New Zealand. Upper scissors link support of main rotor. Possible installation of wrong thrust bearing. Airframe hours: 6616.

Engine/Transmission

N10	Hughes 269A	21 Apr 65	0	D	Columbus, Ohio USA. Engine flywheel weight assembly.
N12	Hughes 269B	25 Feb 66	0	S	May Pen, Jamaica. Fuel feed pipe-line to No. 3 cylinder.
N20	Hughes 269B	4 Feb 67	0	S	Culver City, Cal. USA. Attach fitting of clutch actuator electromechanical unit. No lubrication on pin or fitting.
N21	Hughes 269B	13 May 67	0	S	Saluda, S.C. USA. Malfunction of main rotor gear drive assembly due to failure of huck bolts, P/N SALP-T10-7.
N22	Hughes 269B	30 May 67	0	S	Lakewood, Cal. USA. Improper con rod bolts, P/N 75060, in no. 4 cylinder failed.
N23	Hughes 269A	12 Oct 67	0	S	Lula, Miss. USA. Lower coupling drive shaft, P/N 269A5504
N31	Hughes 269B	17 Aug 69	0	D	Lakewood, Calif. USA. Failure of electro-mechanical actuator in transmission rotor drive system created disconnect of power drive pulley belts to engine.
N32	Hughes 269B	17 Mar 70	0	S	Santa Monica, Cal. USA. No. 4 cylinder connecting rod.
N39	Hughes 269C	3 Dec 71	0	S	Hallandale, Fla. USA. # 1 exhaust valve.
N48	Hughes 269C	19 Oct 72	0	S	Chamblee, Ga. USA. #4 connecting rod bolt. Origin: surface damage.
N55	Hughes 269C	2 Oct 73	2	D	Oakland, Calif. USA. Main-rotor gear drive-shaft failed, main rotor separated.
N56	Hughes 269B	16 Oct 73	2	D	Springfield, Ohio USA. Lower-coupling drive shaft failed, tail-rotor drive-shaft assembly. Tail rotor separated.
N66	Hughes 269B	19 Mar 75	0	S	Gail, Tex. USA. No. 4 conrod.
N77	Hughes 269C	2 Aug 76	0	D	Miyagi Pref., Japan. Stress concentration, exhaust valve of #2 cyl.

N90	Hughes 269C	22 Aug 77	0	D	Yamagata Pref., Japan. Pitting corrosion at 3rd stage compressor blade
N93	Hughes 269B	1 Dec 77	0	S	Speedway, Ind. USA. Main rotor gear box ring gear drive coupling P/N 269A5180.
N112	Hughes 269	1980	0	S	Grove Hill, Australia. Lower pulley coupling shaft in transmission rotor drive system.
N115	Hughes 269C	4 Apr 80	0	D	Te Anga, Te Kuiti, New Zealand. Main rotor ring gear drive shaft, P/N 269A 5179M. Origin: fretting near lockpin holes. Total time: 3316 hours.
N120	Hughes 269B	12 Jul 80	0	S	Washington, D.C. USA. Fatigue fracture of #5 hold down stud on #3 cylinder. Corrosion.
N123	Hughes 269C	31 Oct 80	0	D	170 nm north of Ostersund, Sweden. Transmission drive shaft, P/N 269A5559, broke 9 cm from end. Torsional fatigue. Subsurface initiation.
N125	Hughes 269C	10 Jan 81	0	D	Viper, Ky. USA. Lower coupling drive shaft, PN 269A5504.
N133	Hughes 269C	4 May 81	0	S	Washington, D.C. USA. Main rotor shaft ring gear carrier, P/N 269A5179-3, cracks in outer race support radius

Landing Gear

O5	Hughes 269A	31 Jul 74	0	D	W. Memphis, Ark. USA. Landing gear strut assembly.
O9	Hughes 269C	1978	0	S	Surfers Paradise, Australia. Cracks in both skid gear & left forward shock strut.

Miscellaneous

P26	Hughes 269C	26 Jul 75	0	S	Ensch, W. Germany. Bearing cage of main rotor clutch.

HUGHES 369/500/OH-6A CAYUSE

Tail Rotor

K49	Hughes 369HS	20 Feb 75	0	S	Grand Chenier, La. USA. Tail rotor blade P/N 369A1613-3.
K71	Hughes 369H	25 Jul 77	0	D	Hiroshima Pref. Japan. Tail rotor hub failed (maraging steel). Origin: pitting corrosion.
K81	Hughes 369D	14 Aug 78	0	D	Cascadia, Oregon USA. Tail rotor hinge bearings worn. Vibration allowed tail rotor hub to fail. Role: logging.

Engine/Transmission

N42	Hughes OH-6A Cayuse (US Army)	15 May 72	0	D?	Vn. USA. Engine failure (band & vane assembly).
N47	Hughes OH-6A Cayuse (US Army)	17 Sep 72	0	S	Vn. USA. Engine failure (compressor rotor).
N52	Hughes 369HS	28 Mar 73	0	S	Point La Hache, La. USA. Compressor, spur adapter gear shaft.
N57	Hughes 369H	1974	0	D	Derby, W.A., Australia. Out-of-balance blade due to loss of abrasion tape caused gearbox separation (fatigue) at flange.
N60	Hughes 369HS	2 Apr 74	0	S	Petersburg, Alas. USA. 1st stage turbine wheel (thermal fatigue).
N73	Hughes 500	12 Jan 76	0	S	Mildred Lake, Alta. Canada. Compressor. Allison 250 engine.
N74	Hughes 369HS	26 Jan 76	0	S	Yokohama, Japan. 3rd stage compressor blade. Origin: pitting corrosion.
N78	Hughes 369HS	5 Sep 76	0	S	Hornu, Belgium. 4th stage compressor blade.
N121	Hughes 500	25 Jul 80	0	S	Falcon Lake, Man. Canada. Tooth on output drive bevel gear in main rotor drive assembly. Coarse machining marks in root fillet of teeth.
N136	Hughes 500	24 Aug 81	1	D	Philomena, Alta. Canada. Transmission input pinion (corrosion pit). 2400 hour service life limit possibly exceeded.

Miscellaneous

P37	Hughes 500	8 Oct 79	0	S	Jenpeg, Man. Canada. Tail rotor drive flexible coupling.
P38	Hughes 369D	18 Oct 79	0	D	Trenton, N.J. USA. Tail rotor drive shaft coupling failed, causing tail rotor separation.
P41	Hughes 369HS	26 Jun 80	0	S	Herbert, New Zealand. Tail rotor transmission housing. Total time: 2220 hours. ASTM B80 magnesium casting alloy AZ91C. Origin: microporosity.

KAMAN HH-43

Engine

N110	Kaman HH-43F	24 Aug 79	0	D	Hamilton, Mt. USA. Fracture of engine drive shaft (powershaft) P/N 1-100-620-01 in area of heavy wear.

KAWASAKI KH-4 (See Bell 47)

KAWASAKI KV-107 (see Boeing Vertol Model 107)

MBB BO 105

Engine

N84	MBB BO 105	7 Jun 77	0	S	Intracoastal City, La. USA. Right engine fourth stage turbine wheel shattered. Corroded and fatigue fracture. 3425 hours & 5313 cycles on wheel.

Tail Rotor System

M23	MBB BO 105	15 Dec 77	0	D	Kassel, W. Germany. Tail-rotor pitch control linkage, rotor control shaft fitting. Tail rotor separated

ROBINSON R22

Main Rotor

J55	Robinson R22	Fall 81	?	?	Ellington, Conn. USA. Failure of A161 rotor fitting. Airframe hrs: 691. Ref: Rotor & Wing Intl., Jan. 82 p 62

Miscellaneous

P43	Robinson R22	6 Aug 81	0	S	Cincinnati, Oh. USA. Support bracket for tail rotor drive shaft damper, PN A041-1.

ROTORWAY SCORPION TOO

Tail Rotor

K84	Rotorway Scorpion Too	27 Mar 79	1	S	Johns Island, S. Carolina, USA. Tail rotor blades separated.

S.N.I.A.S. (See Aerospatiale)

SIKORSKY S-51

Main Rotor

J5	Sikorsky S-51	27 Aug 51	1	?	Lynwood, Calif. USA. Fatigue failure of flapping hinge of main rotor hub caused separation of blade.

Tail Rotor System

P8	Sikorsky S-51	29 Aug 67	0	S	Windsor Locks, Conn. USA. Tail rotor drive shaft assembly (drive shaft rivets sheared).

SIKORSKY S-52

Tail Cone Pylon

L5	Sikorsky S-52-3	28 Jun 67	0	S	Kingston, Jamaica. Tail rotor separated. Tail cone pylon tube separated at station 72.

SIKORSKY/WESTLAND S-55 (H-19)

Fuselage

L2	Sikorsky S-55	15 Oct 65	0	S	Fogo Village, Nfld. Canada. Tail rotor pylon lower attachment ring. (Magnesium alloy casting).

L8	Sikorsky S-55	23 Jul 68	0	D	Marathon, Ont. Canada. Bolts attaching the tail rotor pylon assembly (threads).
L13	Sikorsky S-55	19 Sep 73	0	S	Duette, Fla. USA. Tail boom pylon ring P/N S14-20-3013.
L30	Sikorsky S-55	15 Aug 78	0	S	Carver, Ma. USA. Attach bolts of vertical pylon of tail boom.
L31	Sikorsky S-55	6 Nov 78	0	S	Quesnel, B.C. Canada. Tail rotor pylon assembly. Fretting fatigue pre-cracking of assembly in area of tail cone ring. 3860 airframe hours.

Flight Controls

M6	Sikorsky H-19G	1 Oct 68	0	S	Mandeville, La. USA. Tail rotor control rod bearing broke, allowing blades to cone.

Engine/Transmission

N6	Sikorsky S-55	4 Aug 64	0	S	Esker, Lab. Canada. No. 8 cylinder exhaust valve housing at rocker shaft small bushing boss.
N14	Sikorsky S-55	22 Jun 66	0	S	Prince George, B.C. Canada. No. 1 cylinder exhaust rocker box casting.
N51	Westland Whirlwind S-55	28 Feb 73	4	D	Eket, Nigeria. Failure in transmission/rotor drive main gearbox.

Miscellaneous

P9	Westland Whirlwind HC.12 (Queen's Flight, RAF)	7 Dec 67	4	D	England. Main rotor shaft. Crack at rotor head end of drive shaft, inside the main-rotor gearbox.
P17	Sikorsky S-55B	18 Jul 72	0	D	Benicia, Calif. USA. Front transmission support bracket failed. Over-sized engine installed.
P39	Sikorsky S-55	23 Oct 79	1	D	Davenport, Florida, USA. Main transmission support assembly separated.

SIKORKSY S-58/WESTLAND WESSEX

Main Rotor

J7	Sikorsky S-58C	27 Jul 60	13	D	Forest Park, Ill. USA. Main rotor blade. Origin: lower external back-wall radius of spar.
J44	Sikorsky S-58ET	1 Oct 78	1	D	Steamboat Springs, Colo. USA. Horiz hinge pin failed, main rotor blade.

Tail Rotor

K85	Sikorsky S-58ET	16 Mar 79	0	D	Nova Vicosa, Brazil. Tail rotor blade.

	Airframe				
L11	Sikorsky S-58ET	25 Mar 72	0	S	Darwin, Australia. Tail rotor assembly and gear box separated. Cracks in gear box mounting flange. Pylon fitting also had cracks.
	Engine				
N3	Sikorsky S-58D	11 Jul 63	0	S	Larchwood, Ont. Canada. Threaded end of knuckle pin retaining bolt.
N88	Westland Wessex 31B (RAN)	13 Jul 77	0	D	At sea, HMAS Melbourne. Engine compressor blades.
N91	Sikorsky S-58	30 Sep 77	1	S	Garmisch-Partenk, W. Germany. Carburetor: mixture-control pressure-diaphragm.
N96	Westland Wessex 31B (RAN)	22 Jan 78	0	S	At sea, off Nowra, Australia. Drive shaft of engine-driven fuel pump.

SIKORSKY S-61 (SH-3 SEA KING)

	Main Rotor				
J16	Sikorsky S-61L	14 Aug 68	21	D	Compton Calif. USA. Failure of shank of yellow main rotor blade spindle, causing separation of blade.
J29	Sikorsky S-61N	10 May 74	6	D	North Sea, 110 nm n. of Texel, Netherlands. Separation of no. 3 main-rotor blade. Origin: corrosion at bottom of spar, near back wall at pocket # 12. Airframe hours: 3830.
J40	Sikorsky S-61R (US Coast Guard)	May 78	?	?	USA. Main rotor blade separated at 1850 hrs. Origin: fault in plating of spindle lug bore.
J41	Sikorsky S-61N	26 Jun 78	18	D	North Sea, off Norway. Lost a main rotor blade. Failure of rear lug on no. 5 main rotor blade spindle.
	Tail Rotor System				
K86	Sikorsky S-61L	18 Apr 79	3	D	Newark, N.J. USA. 35 in. of black tail rotor blade separated. P/N S6115-30001-044. Origin: outboard corner of aft face of leading-edge spar. 2444 hours on blade.
K99	Westland Sea King HAS Mk.1 (Belgian AF)	28 Apr 81	0	S	Oostende, Belgium. Lug of tail rotor blade fitting.
	Engine/Transmission				
N70	Sikorsky Sea King 50 (RAN)	21 Oct 75	0	D	At sea off Nowra, Australia. Transmission oil filter retaining bolt.
N80	Sikorsky Sea King 50 (RAN)	2 Dec 76	0	D	At sea off Nowra, Australia. Transmission oil filter retaining bolt.

N129	Sikorsky S-61L Mark I	15 Apr 81	0	D	Cape Town, South Africa. Spur gear P/N S6135-20608-1 in main rotor gearbox. Cracks initiated at several positions on hub, and radiated outwards. (Excessive wear on camshaft lobes in roller contact area).
	Landing Gear				
O1	Sikorsky S-61	15 Jul 63	0	S	Los Angeles, Ca. USA. Right main gear failed. Forged fittings P/N S6125-50312-2 and S6125-50313-1. Origin: sharp corner on inside surface of closed end of tubular section.
O2	Sikorsky S-61L	15 Mar 66	0	S	Los Angeles, Cal. USA. Right landing gear brace fitting.
O8	Sikorsky S-61L	16 May 77	5	S	Pan Am building, New York, USA. Upper-right forward fitting of right main landing gear tube assembly. Material: 7075-T73.
	Tail Rotor Drive Shaft				
P36	Sikorsky Sea King 50 (RAN)	23 May 79	0	D	At sea off HMAS Melbourne. Tail rotor drive shaft.

SIKORSKY S-62

	Tail Rotor System				
P27	Sikorsky S-62A	3 Oct 75	0	D	30 km from Reykjavik, Iceland. Driving gear of intermediate gear box failed (fatigue), causing tail rotor failure. A slipping bearing race contributed.

SIKORSKY S-64 SKYCRANE (CH-54)

	Main Rotor				
J49	Sikorsky CH-54A Tarhe ((US Army)	29 Sep 79	4	D	Oh. USA. Main rotor separated (horizontal pin).
	Flight Controls				
M11	Sikorsky S-64E	2 Sep 69	3	D	Prudhoe Bay, Alaska USA. Tail-rotor pitch-control link assembly failed, causing tail rotor to separate.
	Engine				
N135	Sikorsky S-64 Skycrane	5 Jun 81	1	S	Kitsault River, B.C. Canada. No. 1 engine, 6th stage compressor disc.

SIKORSKY S-65A (HH-53/CH-53 SEA STALLION)

	Main Rotor				
J18	Sikorsky CH/HH-53	late 1960s to 1980	?	?	? Spar of main rotor blade.
J19	Sikorsky CH/HH-53	late 1960s to 1980	?	?	? Spar of main rotor blade.
J30	Sikorsky CH-53D Sea Stallion (US Marines)	8 Jan 75	4	?	Salisbury, Md. USA. Main rotor blade.

SIKORSKY S-76 SPIRIT

	Main Rotor				
J42	Sikorsky S-76A	28 Jul 78	0	S	W. Palm Beach, Fla. USA. Main rotor failure, quill shaft. P/N X7606-46420-041.
J51	Sikorsky S-76A	20 Mar 80	14	D	Off the Brazil coast. Inboard spindle bearing became displaced, causing fracture of main rotor head spindle (1st thread at spline inboard end). Total time on spindle: 650 hours.
J53	Sikorsky S-76A	13 Mar 81	4	D	North Sea, Aberdeen, Scotland. Excessive wear on Teflon-impregnated outer bearing caused main rotor spindle to crack at inboard end. Time on spindle: 1250 hrs?
	Flight Controls				
M37	Sikorsky S-76	30 Apr 82	13	D	Krahisland, Thailand. Left tail rotor control cable fractured (improper rigging).

SOLOY 47 (See Bell 47)

SUD AVIATION (See Aerospatiale)

TOM CAT I

	Tail Rotor				
K93	Tom Cat I	1 May 80	0	D	Watsonville, Ca. USA. Tail rotor blade. Blade was 632 hours beyond required removal time. 1232 hours on blade. Role: crop spraying. P/N 47-642-102.

VERTOL MODEL 42/H-21 WORK HORSE

	Main Rotor				
J9	Vertol 42A H-21B Work Horse	17 Oct 63	0	S	Brass Radio Station, Que. Canada. Rear green main rotor blade at tubular spar 3 feet outboard of rotor head. (Corrosion pits).

VERTOL MODEL 44

	Main Rotor				
J6	Vertol 44B	12 May 59	0	S	New York, N.Y. USA. Tuning weight strap in forward rotor blade.

VERTOL MODEL 107 (See Boeing Vertol Model 107)

WESTLAND WESSEX (See Sikorsky S-58)

WESTLAND WHIRLWIND (See Sikorsky S-55)

WESTLAND SEA KING (See Sikorsky S-61)

TYPE UNKNOWN (AUTOGYRO)

	Main Rotor				
J1	autogyro (USAF)	1937	0	D	USA. Main rotor blade at outboard pin hole of hub attachment.

TYPE UNKNOWN (HELICOPTER)

Main Rotor

J2	Type unknown (US helicopter)	1940-51	1?	?	USA. Main rotor link at lower lug. Origin: inside of hole at point where bushing ended.

TYPE UNKNOWN (HELICOPTER)

Main Rotor

J3	Type unknown (helicopter)	3 Apr 46	?	D	USA? Certified helicopter with less than 100 hours total time crashed. Failure of rotor hub.

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DATE 83-04 9	FILE/DOSSIER 10	LAB. ORDER COMMANDE DU LAB. 11	PAGES 88 12a	FIGS/DIAGRAMMES 4 12b

NOTES

13

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14

SUMMARY/SOMMAIRE

This is Volume 2 of a world-wide survey of serious aircraft accidents involving fatigue fracture. Volume 2 of the report deals with rotary-wing aircraft, while Volume 1 addressed fixed-wing aircraft. A total of 419 rotary-wing accidents since 1937 were identified as having fatigue fracture as a related cause, and these accidents resulted in 379 fatalities. The accidents cover civil and, to a limited extent, military aircraft. Accidents are listed by failure type, as well as by aircraft type. Engine/transmission failure and tail-rotor failure were the most common cause of rotary-wing accidents, and currently there is an average of about 31 rotary-wing fatigue accidents per year.

15